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HUMAN RESOURCES, LOGISTICS, AND COST FACTORS IN WEAPON SYSTEM D--ETC(U)

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F33615-77-C-0016

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AFHRL-TR-79-28(II)

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AIR FORCE



**HUMAN
RESOURCES**

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**HUMAN RESOURCES, LOGISTICS, AND COST FACTORS
IN WEAPON SYSTEM DEVELOPMENT:**

**DEMONSTRATION IN CONCEPTUAL AND VALIDATION
PHASES OF AIRCRAFT SYSTEM ACQUISITION**

APPENDIX A

By

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September 1979

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LABORATORY

**AIR FORCE SYSTEMS COMMAND
BROOKS AIR FORCE BASE, TEXAS 78235**

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This interim report was submitted by Dynamics Research Corporation, 60 Concord Street, Wilmington, Massachusetts 01887, under contract F33615-77-C-0016, project 1959, with Advanced Systems Division, Air Force Human Resources Laboratory (AFSC), Wright-Patterson Air Force Base, Ohio 45433. Dr. William B. Askren (ASR) was the Contract Monitor for the Laboratory.

This report has been reviewed by the Information Office (OI) and is releasable to the National Technical Information Service (NTIS). At NTIS, it will be available to the general public, including foreign nations.

This technical report has been reviewed and is approved for publication.

GORDON A. ECKSTRAND, Technical Director
Advanced Systems Division

RONALD W. TERRY, Colonel, USAF
Commander

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The Coordinated Human Resource Technology and the Consolidated Data Base have been demonstrated in the conceptual and validation phase of weapon system acquisition. The results of this demonstration are reported in AFHRL-TR-79-28(I). This report (Volume II) constitutes Appendix A to that demonstration report and provides additional details of the demonstration.			

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A-I. INTRODUCTION

The information enclosed in this appendix was developed during the demonstration of the coordinated human resource technology (CHRT) in the conceptual and validation phases of aircraft system acquisition. This data supplements that included in the basic report and provides significant additional detail.

A-II COMPARABILITY REFERENCE DATA

TECHNICAL ORDER (T.O.) REFERENCES LANDING GEAR	
	T.O. 1C-141A-2-12JG-1
	T.O. 1C-141A-2-1GA-2
	T.O. 1C-141A-2-12TS-1

TECHNICAL ORDER (T.O.) REFERENCES AVIONICS

Subsystem	T.O. Reference	Subsystem	T.O. Reference
Inertial Navigation System (INS)	1A-7D-2-12	Very High Frequency (VHF)/Amplitude Modulation (AM) Radio	1C-130B-2-8
High Frequency (HF) Radio	1F-15A-2-18	Integrator Friend or Foe (IFF)	12P4-2APX72-2
	1F-111(B)A-2-17-1	Automatic Direction Finder (ADF)/Ultra High Frequency (UHF)	1C-130B-2-8
	1F-111(B)A-2-18-1	Station Keeping Equipment (SKE)	1C-130E-2-8-2
	12R2-2ARC123-12	Radar	12P5-2APN-169-2
	--22	UHF/AM Radio	1C-141A-2-1GA-4
	--32	Visual Omni Range (VOR)/Instrument Landing System (ILS)	1C-141A-2-8-JG-1
	--42	ADF	1C-141A-2-8-TS-1
Tactical Air Navigation System (TACAN)	1F-111(B)A-2-17-1	IFF Computer	1A-7D-2-12
Digital Scan Converter Radar	12RS-2ARN84	Cathode Ray Tube (CRT) Display	1A-7D-2-12
	1F-111(D)-2-5-1	Mission Computer	1A-7D-2-12
	1C-135(K)A-2-11JG-6	Radar Altimeter	1A-7D-2-12
	.7	Micro Heads Up Display (HUD)	1A-7D-2-14
	.8	Secure Voice	1A-7D-2-12
Intercom	1C-135(K)A2-11MS-8	Crash Position Indicator	1C-141A-2-1GA
Public Address	12P5-2APN-59-22	Integrated Communication Controls	None
	12R2-2AIC10-22	Integrated Navigation Controls	None
	12R2-2AIC13-2		

OPERATOR

COMPARABLE COURSE REFERENCE

C-130EP01PR, PILOT	INITIAL
C-130EP01NR, NAVIGATOR	INITIAL
C-130EP01FR, FLIGHT ENGINEER	INITIAL
C-130EP91LR, LOADMASTER	INITIAL
C-130EP02PR, PILOT	MISSION
C-130EP02NR, NAVIGATOR	MISSION
C-130EP02LR, LOADMASTER	MISSION

A-III. DESIGN OPTION DECISION TREE AND ALTERNATIVE LISTINGS (CONCEPTUAL PHASE)

This section provides only listings of the Design Option Decision Trees developed and additional alternatives possible in the conceptual phase. A partial set of Design Option Decision Trees are included in this appendix. A full set of Design Option Decision Trees will be provided in a future report that will document the results of the demonstration of CHRT during the full-scale development phase.

DESIGN OPTION DECISION TREE
DRAWING LIST

DWG #	TITLE	SHEET	OF
1000	AMST System	1	1
1100	AMST Avionics	1	8
1100	AMST Avionics Electronic Counter Measures (ECM)	2	8
1100	AMST Avionics (Radar)	3	8
1100	AMST Avionics (Navigation)	4	8
1100	AMST Avionics (Communications)	5	8
1100	AMST Avionics (Integration)	6	8
1100	AMST Avionics (Information Processing)	7	8
1100	AMST Avionics (Instruments & Display)	8	8
1200	AMST Landing Gear	1	3
1200	AMST Landing Gear (Main Gear)	2	3
1200	AMST Landing Gear (Nose Gear)	3	3

**ALTERNATIVES
MAINTENANCE/OPERATIONS/SUPPORT**

1. TWO-MAN VS. THREE-MAN FLIGHT DECK
2. LIMITED ADVERSE WEATHER AERIAL DELIVERY
SYSTEM (AWADS) CAPABILITY
3. FRONT END LOADING
4. FERRY RANGE
5. PAYLOAD
6. STOL¹ FIELD LENGTH
7. RUNWAY SURFACE
8. SINK RATE

¹Short takeoff and landing

**A-IV TECHNICAL DATA ESTIMATING ALGORITHMS AND
COST FORMULAS (CONCEPTUAL PHASE)**

ALGORITHMS FOR ESTIMATING CONVENTIONAL TO PAGE REQUIREMENTS	Page
AVIONICS	
FLIGHT LINE/TROUBLESHOOT	11
FLIGHT LINE/NON-TROUBLESHOOT	12
SHOP/TROUBLESHOOT	13
SHOP/NON-TROUBLESHOOT	14
LANDING GEAR	
FLIGHT LINE/TROUBLESHOOT	15
FLIGHT LINE/NON-TROUBLESHOOT	15
SHOP/TROUBLESHOOT	16
SHOP/NON-TROUBLESHOOT	17
ALGORITHMS FOR ESTIMATING FULLY PROCEDURALIZED JOB GUIDE PAGE REQUIREMENTS	
AVIONICS	
FLIGHT LINE/TROUBLESHOOT	18
FLIGHT LINE/NON-TROUBLESHOOT	19
SHOP/TROUBLESHOOT	20
SHOP/NON-TROUBLESHOOT	21
LANDING GEAR	
FLIGHT LINE/TROUBLESHOOT	22
FLIGHT LINE/NON-TROUBLESHOOT	23
SHOP/TROUBLESHOOT	24
SHOP/NON-TROUBLESHOOT	25
COSTING FORMULAS	26

JGD AVIONICS

CONVENTIONAL

TROUBLESHOOT-FLIGHT LINE (TS-FL)

- o 2 ACTIONS/SUBSYSTEM
 - o SET UP SUPPORT EQUIPMENT
 - o OPERATE SUPPORT EQUIPMENT
- o 2 ACTIONS/LINE REPLACEABLE UNIT (LRU)
 - o TROUBLESHOOT LRU
 - o TROUBLESHOOT LRU INTERFACE
- o ½ PAGE PER ACTION
- o +½ PAGE NARRATIVE/LRU
- o +1 PAGE/SCHEMATIC
- o +½ PAGE/PICTORIAL
- o 1 SCHEMATIC/LRU
- o 2 PICTORIALS/LRU

2-MAN CREW

SUBSYSTEMS = 26
LRU = 48
ACTIONS = 148
PICTORIALS = 96
SCHEMATICS = 48
NO. OF PAGES = 74 + 24 + 48 + 48 = 194

3-MAN CREW

SUBSYSTEMS = 20
LRU = 45
ACTIONS = 130
SCHEMATICS = 45
PICTORIALS = 90
NO. OF PAGES = 65 + 22.5 + 45 + 45 = 178

JGD AVIONICS

CONVENTIONAL

NON-TROUBLESHOOT-FLIGHT LINE (NTS-FL)

- o 5 ACTIONS/LRU
- o ½ PAGE/ACTION
- o +½ PAGE NARRATIVE/LRU
- o +½ PAGE/PICTORIAL
- o 1 PICTORIAL/LRU

2-MAN CREW

LRU = 48

ACTIONS = 240

PICTORIALS = 48

NO. OF PAGES = $120 + 24 + 24 = 168$

3-MAN CREW

LRU = 45

ACTIONS = 225

PICTORIALS = 45

NO. OF PAGES = $112.5 + 22.5 + 22.5 = 158$

JGD AVIONICS

CONVENTIONAL TROUBLESHOOT (TS) - SHOP

- o 1 ACTION/LRU + 1 ACTION/SHOP REPLACEABLE UNIT (SRU)
- o ½ PAGE/ACTION
- o +½ PAGE/PICTORIAL
- o +1 PAGE/SCHEMATIC
- o +2 PAGES/GRAPHIC
- o +3 PICTORIALS/LRU + 2 PICTORIALS/SRU
- o 1 SCHEMATIC/LRU + 2 SCHEMATICS/SRU
- o 1 GRAPHIC/LRU

2-MAN CREW

LRU = 48
SRU = 422
ACTIONS = 470
PICTORIALS = 988
SCHEMATICS = 892
GRAPHICS = 48
NO. OF PAGES = 235 + 494 + 892 + 96 = 1717

3-MAN CREW

LRU = 45
SRU = 395
ACTIONS = 440
PICTORIALS = 925
SCHEMATICS = 835
GRAPHICS = 45
NO. OF PAGES = 220 + 462.5 + 835 + 90 = 1608

JGD AVIONICS

CONVENTIONAL

NON-TROUBLESHOOT (NTS) - SHOP

- o 6 ACTIONS/LRU
- o 2 ACTIONS/SRU
- o ½ PAGE NARRATIVE/LRU + ½ PAGE/SRU
- o +½ PAGE/ACTION
- o +1 PAGE/SCHEMATIC
- o +½ PAGE/PICTORIAL
- o 2 PICTORIALS/LRU + 1 PICTORIAL/SRU
- o 1 SCHEMATIC/LRU + 1 SCHEMATIC/SRU

2-MAN CREW

LRU = 48
SRU = 422
ACTIONS = 1132
PICTORIALS = 518
SCHEMATICS = 470
NO. OF PAGES = (24 + 211) + 566 + 518 + 235 = 1554

3-MAN CREW

LRU = 45
SRU = 395
ACTIONS = 1060
PICTORIALS = 485
SCHEMATICS = 440
NO. OF PAGES = 22.5 + 197.5 + 530 + 440 + 242.5 = 1433

JGD LANDING GEAR

CONVENTIONAL

TS-FL

- o 3 ACTIONS/SUBSYSTEM
- o 1 ACTION/ASSEMBLY
- o 1/3 PAGE/ACTION
- o ¼ PAGE NARRATIVE/ASSEMBLY
- o ½ PAGE/PICTORIAL

SUBSYSTEMS = 7

ASSEMBLIES = 135

ACTIONS = 156

PICTORIALS = 148

NO. OF PAGES = 52 + 33.75 + 74 = 160

JGD LANDING GEAR

CONVENTIONAL

NTS-FL

- o 5 ACTIONS/ASSEMBLY
- o ¼ PAGE NARRATIVE/ASSEMBLY
- o +1/3 PAGE/ACTION
- o +½ PAGE/PICTORIAL
- o 1 PICTORIAL/ASSEMBLY + 1 PICTORIAL/LRU

ASSEMBLIES = 135

ACTIONS = 675

PICTORIALS = 270

NO. OF PAGES = 33.75 + 225 + 135 = 394

JGD LANDING GEAR

CONVENTIONAL TS-SHOP

- o 1 ACTION/ASSEMBLY
- o 1/3 PAGE/ACTION
- o +½ PAGE/PICTORIAL
- o +1 PAGE/SCHEMATIC
- o 1 PICTORIAL/ASSEMBLY
- o 2 SCHEMATICS (FLOW DIAGRAMS)/LRU

LRU = 13

ASSEMBLIES = 135

ACTIONS = 135

NO. OF PAGES = 45 + 67.5 + 26 = 139

JGD LANDING GEAR

CONVENTIONAL

NTS - SHOP

- o 3 ACTIONS/ASSEMBLY
- o ¼ PAGE NARRATIVE/LRU
- o +¼ PAGE NARRATIVE/ASSEMBLY
- o +1/3 PAGE/ACTION
- o +½ PAGE/PICTORIAL
- o +1 PAGE/SCHEMATIC
- o +1 PAGE/FLOW DIAGRAM
- o 1 PICTORIAL/ASSEMBLY
- o 1 SCHEMATIC/SUBSYSTEM
- o 1 FLOW DIAGRAM/SUBSYSTEM

SUBSYSTEMS = 7

ASSEMBLIES = 135

ACTIONS = 405

PICTORIALS = 135

SCHEMATICS = 7

FLOW DIAGRAMS = 7

NO. OF PAGES = 3.25 + 33.75 + 135 + 67.5 + 14 = 254

JGD AVIONICS

PROCEDURALIZED

TS-FL

- o 2 ACTIONS/SUBSYSTEM
 - o SET UP SUPPORT EQUIPMENT
 - o OPERATE SUPPORT EQUIPMENT
- o 2 ACTIONS/LRU
 - o TROUBLESHOOT LRU
 - o TROUBLESHOOT LRU INTERFACE
- o 1 PAGE NARRATIVE/ACTION
- o +½ PAGE NARRATIVE/LRU
- o +1 PAGE/SCHEMATIC
- o +1 PAGE/PICTORIAL
- o 2 PICTORIALS/LRU
- o 1 SCHEMATIC/LRU

2-MAN CREW

SUBSYSTEMS = 26

LRU = 48

ACTIONS = $(2 \times 26) + (2 \times 48) = 148$

PICTORIALS = $(2 \times 48) = 96$

SCHEMATICS = 48

NO. PAGES = $148 + (\frac{1}{2} \times 48) + 48 + 96 = 316$

3-MAN CREW

SUBSYSTEMS = 20

LRU = 45

ACTIONS = $(2 \times 20) + (2 \times 45) = 130$

PICTORIALS = 90

SCHEMATICS = 45

NO. PAGES = $130 + (\frac{1}{2} \times 45) + 90 + 45 = 289$

JGD AVIONICS

PROCEDURALIZED

NTS-FL

- **5 ACTIONS/LRU**
 - **CALIBRATE**
 - **ADJUST**
 - **REPAIR (MINOR MAINTENANCE)**
 - **REMOVE/REPLACE**
 - **CHECK/CND**
- **2 PAGES/ACTION**
- **+1 PAGE/PICTORIAL**
- **2 PICTORIALS/ACTION**

2-MAN CREW

LRU = 48

ACTIONS = $5 \times 48 = 240$

PICTORIALS = 480

NO. PAGES = $480 + 480 = 960$

3-MAN CREW

LRU = 45

ACTIONS = $5 \times 45 = 225$

PICTORIALS = 450

NO. PAGES = $450 + 450 = 900$

JGM AVIONICS

PROCEDURALIZED

TS-S

- 1 ACTION/LRU
- 1 ACTION/SRU
 - TROUBLESHOOT LRU OR SRU
- 1 PAGE/ACTION
- +½ PAGE NARRATIVE/LRU
- +½ PAGE NARRATIVE/SRU
- +1 PAGE PICTORIAL
- 1 PICTORIAL/LRU + 2 PICTORIALS/SRU

2-MAN CREW

LRU = 48

SRU = 422

ACTIONS = $48 + 422 = 470$

PICTORIALS = $48 + 844 = 892$

NO. PAGES = $470 + (\frac{1}{2} \times 48) + (\frac{1}{2} \times 422) + 892$
 $470 + 24 + 211 + 892 = 1597$

3-MAN CREW

LRU = 45

SRU = 395

ACTIONS = $45 + 395 = 440$

PICTORIALS = $45 + 790 = 835$

NO. PAGES = $440 + (\frac{1}{2} \times 45) + (\frac{1}{2} \times 395) + 835$
 $440 + 22.5 + 197.5 + 835 = 1496$

JGM AVIONICS

PROCEDURALIZED

NTS-S

- **6 ACTIONS/LRU**
 - **SET UP SUPPORT EQUIPMENT**
 - **OPERATE SUPPORT EQUIPMENT**
 - **CALIBRATE/ALIGN**
 - **ADJUST**
 - **MAINTAIN/REPAIR**
 - **SERVICE**
- **2 ACTIONS/SRU**
 - **REMOVE/REPLACE**
 - **MAINTAIN/REPAIR**
- **2 PAGES/ACTION**
- **+1 PAGE/PICTORIAL**

2-MAN CREW

LRU = 48

SRU = 422

ACTIONS = (6 x 48) + (2 x 422) = 1132

PICTORIALS = 2 x 1132 = 2264

NO. PAGES = (2 x 1132) + 2264 = 4528

3-MAN CREW

LRU = 45

ACTIONS = (6 x 45) + (2 x 395) = 1060

SRU = 395

PICTORIALS = 2 x 1060 = 2120

NO. PAGES = 2120 + 2120 = 4240

JGD LANDING GEAR

FULLY PROCEDURALIZED

TS-FL

- 3 ACTIONS/SUBSYSTEM
 - TROUBLESHOOT SUBSYSTEM
 - SET UP SUPPORT EQUIPMENT
 - SCHEDULED INSPECTION
- 1 ACTION/ASSEMBLY
 - TROUBLESHOOT ASSEMBLY
 - ASSEMBLY = SRU - C141WUC (5 digits)
- 4 STEPS/ACTION
- 1 PAGE/ACTION
- 1 SCHEMATIC/SUBSYSTEM
- 2 PAGES/SCHEMATIC
- 1 PICTORIAL/ASSEMBLY
- 1 PICTORIAL/PAGE

SUBSYSTEM = 7

ASSEMBLIES = 135

ACTIONS = $(3 \times 7) + 135 = 156$

STEPS = 624

SCHEMATICS = 7

PICTORIALS = 135

NO. PAGES = $156 + 135 + 14 = 305$ PAGES

JGD LANDING GEAR

FULLY PROCEDURALIZED

NTS-FL

- 5 ACTIONS/ASSEMBLY

- SERVICE
- ADJUST
- REMOVE
- REPLACE
- CHECK

o ASSEMBLY = SRU - C141WUC (5 digits)

- 20 STEPS/ACTION
- 10 STEPS/PAGE
- 2 PAGES NARRATIVE/ACTION
- 2 PICTORIALS/ACTION
- 1 PICTORIAL/PAGE
- 2 PAGES PICTORIALS/ACTION

ASSEMBLIES = 135

ACTIONS = $5 \times 135 = 675$

STEPS = 13500

PICTORIALS = $2 \times 675 = 1350$

NO. PAGES = $(2 \times 675) + 1350 = 2700$ PAGES

JGD LANDING GEAR

LLY PROCEDURALIZED

NTSS

- 3 ACTIONS/ASSEMBLY
 - DISASSEMBLE
 - ASSEMBLE
 - REPAIR & MAINTAIN
 - ASSEMBLE = SRU - C141WUC (5 digits)
- 20 STEPS/ACTION
- 10 STEPS/PAGE
- 2 PAGES/ACTION
- 2 PICTORIALS/ACTION
- 1 PAGE/PICTORIAL

ASSEMBLIES = 135

ACTIONS = 3 x 135 = 405

STEPS = 8100

PICTORIALS = 810

NO. PAGES = (2 x 405) + (2 x 405)

810 + 810 = 1620 PAGES

JGD LANDING GEAR

LLY PROCEDURALIZED

TSS

- 1 ACTION/ASSEMBLY
 - TEST ASSEMBLY
 - ASSEMBLY = SRU - C141WUC (5 digits)
- 4 STEPS/ACTION
- 1 PAGE/ACTION
- 1 SCHEMATIC/SURSYSTEM
- 2 PAGES/SCHEMATIC
- 1 PICTORIAL/ACTION
- 1 PAGE/PICTORIAL

SUBSYSTEMS = 7

ASSEMBLIES = 135

ACTIONS = 135

SCHEMATICS = 7

PICTORIALS = 135

NO. PAGES = 135 + (2 x 7) + 135 = 284 PAGES

COST ESTIMATE FACTORS

LANDING GEAR CONVENTIONAL

TS-FL	\$200/ACTION \$220/PAGE NARRATIVE \$100/PICTORIAL
NTS-FL	\$220/PAGE NARRATIVE \$100/PICTORIAL
TS-SHOP	\$200/ACTION \$100/PICTORIAL \$ 75/SCHEMATIC
NTS-SHOP	\$220/PAGE NARRATIVE \$220/PAGE ACTION \$100/PICTORIAL \$ 75/SCHEMATIC \$ 75/DIAGRAM

AVIONICS

TS-FL	\$300/ACTION \$220/PAGE NARRATIVE \$ 75/SCHEMATIC \$100/PICTORIAL
NTS-FL	\$220/PAGE ACTION \$220/PAGE NARRATIVE \$100/PICTORIAL
TS-SHOP	\$300/ACTION \$100/PICTORIAL \$ 75/SCHEMATIC \$1000/GRAPHIC
NTS-SHOP	\$220/PAGE NARRATIVE \$110/ACTION \$ 75/SCHEMATIC \$100/PICTORIAL

**LANDING GEAR
PROCEDURALIZED**

TS-FL	\$200/ACTION \$ 75/SCHEMATIC \$200/PICTORIAL
NTS-FL	\$200/PAGE NARRATIVE \$100/PICTORIAL \$400/ACTION
TS-SHOP	\$200/ACTION \$ 75/SCHEMATIC \$100/PICTORIAL
NTS-SHOP	\$400/ACTION \$100/PICTORIAL \$200/PAGE NARRATIVE

**AVIONICS
PROCEDURALIZED**

TS-FL	\$500/PAGE ACTION \$200/PAGE NARRATIVE \$ 75/SCHEMATIC \$100/PICTORIAL
NTS-FL	\$200/PAGE ACTION \$100/PICTORIAL
TS-SHOP	\$500/PAGE ACTION \$200/PAGE NARRATIVE \$100/PICTORIAL
NTS-SHOP	\$400/ACTION \$100/PICTORIAL

A-V OPERATOR TASK LIST

Pilot/Copilot

FLIGHT PHASE	AMST UNIQUE	FLIGHT ENGINEER RELATED	NAVIGATOR RELATED
FLIGHT PLANNING	<ul style="list-style-type: none"> • INCREASED & DIFFERENT PERFORMANCE COMPUTATIONS 	<ul style="list-style-type: none"> • PREPARE PERFORMANCE DATA 	<ul style="list-style-type: none"> • PREPARE FLIGHT PLAN AND NAVIGATION LOG
PREFLIGHT	<ul style="list-style-type: none"> • CHECK COMPLEX FLIGHT/STABILITY CONTROL SYSTEM 	<ul style="list-style-type: none"> • CHECK ALL AIRCRAFT SYSTEMS FOR OPERATION 	<ul style="list-style-type: none"> • CHECK ALL NAVIGATION AND COMMUNICATION EQUIPMENT • CALIBRATE/INITIATE HEADING & POSITION DEVICES • CHECK ALL INTER-RELATED AVIONIC FUNCTIONS • CHECK RADAR/LORAN, etc.
ENGINE START/TAXI/BEFORE TAKEOFF	<ul style="list-style-type: none"> • CHECK FLIGHT/STABILITY CONTROL SYSTEM FOR OPERATION IN ALL MODES SET FOR TAKEOFF 	<ul style="list-style-type: none"> • CHECK/SET ALL SYSTEMS. SET FOR TAKEOFF • CHECK ENGINE PERFORMANCE 	<ul style="list-style-type: none"> • CHECK NAVIGATION AND COMMUNICATIONS EQUIPMENT. SET FOR TAKEOFF • UPDATE HEADING AND POSITION DEVICES • SET ALL AVIONICS FOR TAKEOFF
TAKEOFF/CLIMBOUT	<ul style="list-style-type: none"> • MONITOR FLIGHT/STABILITY CONTROL SYSTEM • ACCOMPLISH CONFIGURATION CHANGES 	<ul style="list-style-type: none"> • SET/HOLD POWER • MONITOR ALL SYSTEMS AND ADJUST AS NECESSARY 	<ul style="list-style-type: none"> • NAVIGATE AIRCRAFT • MONITOR DEPARTURE • PROVIDE TIME/POSITION DATA • ACCOMPLISH ROUTE CHANGES
CRUISE	<ul style="list-style-type: none"> • SET FLIGHT/STABILITY CONTROL SYSTEM FOR CRUISE 	<ul style="list-style-type: none"> • COMPUTE CRUISE DATA • MONITOR ALL AIRCRAFT SYSTEMS & SET/MAINTAIN FOR CRUISE • SET/MAINTAIN POWER 	<ul style="list-style-type: none"> • NAVIGATE AIRCRAFT • PROVIDE POSITION/PERFORMANCE DATA • UPDATE ESTIMATES • ACCOMPLISH ROUTE CHANGES • VALIDATE POSITION DATA
DESCENT	<ul style="list-style-type: none"> • ESTABLISH AIRCRAFT DESCENT CONFIGURATION 	<ul style="list-style-type: none"> • ESTABLISH SYSTEMS DESCENT CONFIGURATION • MONITOR ALL SYSTEMS & ADJUST AS NECESSARY • SET/ADJUST POWER • PREPARE PERFORMANCE DATA 	<ul style="list-style-type: none"> • MAINTAIN POSITION DATA • VALIDATE EXTERNAL DIRECTION

OPERATOR TASK LIST - Pilot/Copilot (continued)

APPROACH/ LANDING	<ul style="list-style-type: none"> • MONITOR FLIGHT/STABILITY CONTROL SYSTEM. INITIATE CONFIGURATION CHANGES 	<ul style="list-style-type: none"> • MONITOR ALL AIRCRAFT SYSTEMS ADJUST AS NECESSARY • COMPUTE LANDING DATA 	<ul style="list-style-type: none"> • MAINTAIN INDEPENDENT POSITION ESTIMATE • VALIDATE EXTERNAL DIRECTION • PREPARE GO-AROUND NAVIGATIONAL DIRECTION
ROLLOUT		<ul style="list-style-type: none"> • MONITOR ADJUST ALL SYSTEMS 	
POST- FLIGHT		<ul style="list-style-type: none"> • SHUTDOWN ALL SYSTEMS • NOTE ALL WRITEUPS 	<ul style="list-style-type: none"> • SHUTDOWN ALL AVIONICS • NOTE ALL WRITEUPS
EMERGENCY PROCEDURES	<ul style="list-style-type: none"> • INITIATE ALL CHECKLISTS 	<ul style="list-style-type: none"> • MONITOR/SCAN ALL SYSTEMS • TROUBLESHOOT MALFUNCTIONS • SET SYSTEMS TO BE COMPUTABLE WITH EMERGENCY CONDITION • FIGHT INTERNAL CABIN/FUSELAGE FIRE 	<ul style="list-style-type: none"> • ESTABLISH POINT POSITION DATA • SET ROUTE TO EMERGENCY LANDING SITE • INITIATE EMERGENCY CALLS AND CODES • FIGHT INTERNAL CABIN/FUSELAGE FIRE
TACTICAL LOW LEVEL		<ul style="list-style-type: none"> • MONITOR ALL AIRCRAFT SYSTEMS 	<ul style="list-style-type: none"> • (LEAD) NAVIGATE AIRCRAFT BY VISUAL AND/OR ELECTRONIC MEANS • (IN TRAIL) VERIFY POSITION DATA - MAINTAIN FORMATION POSITION • (ALL) MONITOR TERRAIN/AIRCRAFT CLEARANCE, MONITOR ROUTE & SPEEDS
AIR DROP/ EXTRACTION		<ul style="list-style-type: none"> • MONITOR ALL AIRCRAFT SYSTEMS • COORDINATE AIR/LOOP/EXTRACTION SYSTEM, CARGO/TROOP READINESS, AND DOOR OPENING WITH LOADMASTER 	<ul style="list-style-type: none"> • (LEAD) NAVIGATE AIRCRAFT, UPDATE ETA, ENROUTE • UPDATE DRIFT AND GROUND SPEED FOR DZ • PROVIDE ESSENTIAL DATA TO FORMATION AIRCRAFT • UPDATE CARP • CALL SLOWDOWN • PROVIDE DROP SIGNAL • (IN TRAIL) ACCEPT/VERIFY LEAD DATA • UPDATE DRIFT AND GROUND SPEED COMPUTATIONS • (ALL) MONITOR TERRAIN/AIRCRAFT CLEARANCE
ASSAULT LANDING	<ul style="list-style-type: none"> • MANAGE FLIGHT CONTROL AND STABILITY SYSTEMS • MONITOR AIRSPEED/ALTITUDE/DESCENT RATE 	<ul style="list-style-type: none"> • MONITOR ALL SYSTEMS AND INITIATE CHANGES AS NECESSARY 	<ul style="list-style-type: none"> • MAINTAIN POSITION AND GO-AROUND NAVIGATION DATA

A-VI. SYSTEM OWNERSHIP COST EQUATIONS

THE SOC MODEL (ANNUAL COST)		
INVESTMENT	Support Equipment	CSE
	Job Guides	CJG
	Spares	CSP
	Facilities	CFA
OPERATING ACTIVITY		
FIELD SUPPORT	Aircrew	CAC
	Fuel	CFL
DEPOT SUPPORT	Equipment Maintenance	CEM
	Training	CPT
DISPOSAL	Depot Repair	CDR
	Inventory Management	CIM
	Software Support	CSW
	Disposal	CDS

ANNUAL COST OF SUPPORT EQUIPMENT, C_{SE}

$$C_{SE} = \sum_{j=1}^K \underbrace{(NSER_j)(UCSE_j) \left[\frac{1}{PIUP} + MSE_j \right]}_{\text{cost per unit of SE}} + \underbrace{M[BCA + BPA + FLA] + CS + IH}_{\text{other base-level SE costs}} \frac{1}{PIUP}$$

NSER_j = number of peculiar support equipment required

UCSE = unit cost of peculiar SE at base level

PIUP = operational service life of the weapon system (Program Inventory Usage Period)

MSE = factor, as a fraction of SE unit cost, representing annual non-personnel cost of maintaining SE

M = number of operating base locations

BCA = total cost of additional items of common base shop support equipment per base required for the system

BPA = total cost of peculiar base shop support equipment per base required for the system which is not directly related to repair of specific LRUs or when the quantity required is independent of the anticipated workload (such as: overhead cranes and shop fixtures)

FLA = total cost of peculiar flightline support equipment and additional items of common flightline support equipment per base required for the system

CS = cost of software to utilize existing Automatic Test Equipment for the system (0)

IH = cost of interconnection hardware to utilize existing Automatic Test Equipment for the system (0)

j = subscript identifying jth group of peculiar support equipment (where 1, 2, 3, . . . } . . . K)

K = number of units of peculiar support equipment for supporting LRUs

ANNUAL COST OF JOB GUIDES, CJG

$$CJG = \frac{1+FJG}{PIUP} \left\{ \sum_{m=1}^Z [(NLRU_m)(CNFL) + (NMFF_m)(CNF) + (NLRU_m)(CTFL)] \right. \\ \left. + [(NMFS_m)(CNS) + (NLRU_m)(CNSL) + (NSRU_m)(CNSS) + (NLRU_m)(CTSL) + (NSRU_m)(CTSS)] \right\}$$

Cost of Flightline Job Guides

Cost of Shop Job Guides

FJG = factor, as a function of job guide costs, representing cost of general material found in job guide
 PIUP = operational service life of weapon system (Program Inventory Usage Period)
 NLRU = number of LRUs in mth subsystem
 NSRU = number of SRUs in mth subsystem
 NMFF = number of flightline non-troubleshooting maintenance functions
 NMFS = number of shop non-troubleshooting maintenance functions
 CNF = cost of flightline non-troubleshooting maintenance functions
 CNFL = cost of flightline non-troubleshooting maintenance per LRU (=0 for proceduralized job guides)
 CTFL = cost of flightline troubleshooting maintenance per LRU
 CNS = cost of shop non-troubleshooting maintenance function
 CNSL = cost of shop non-troubleshooting maintenance per LRU (=0 for proceduralized job guides)
 CNSS = cost of shop non-troubleshooting maintenance per SRU (=0 for proceduralized job guides)
 CTSL = cost of shop troubleshooting maintenance per LRU
 CTSS = cost of shop troubleshooting maintenance per SRU

m = subscript identifying mth subsystem (where 1,2,3, . . . , m, . . . Z)
 Z = number of different subsystems in system

ANNUAL COST OF SPARES, C_{Sp}

$$C_{Sp} = \underbrace{\frac{M}{PIUP} \times \sum_{i=1}^N \left\{ (STKL_i)(UC_i) + \frac{(PFFH)(OPA_i)(UF_i)(DCRT_i)(NRTS_i)}{MTBMA_i} \right\}}_{\text{LRU Shop Spares}} + \underbrace{\sum_{i=1}^N \frac{(AFH)(OPA_i)(UF_i)(FCS_i)}{MTBMA_i}}_{\text{LRU Depot Pipeline Spares}} + \underbrace{\sum_{i=1}^N \frac{(AFH)(OPA_i)(UF_i)(FCL_i)}{MTBMA_i}}_{\text{LRU Replacement Spares}}$$

$$+ \underbrace{\frac{M}{PIUP} \times \sum_{i=1}^N \left\{ (STKS_i) \left(\frac{UC_i}{NSRU_i} \right) + \frac{(PFFH)(OPA_i)(UF_i)(DCRT_i)}{MTBMA_i} \right\}}_{\text{SRU Shop Spares}} + \underbrace{\sum_{i=1}^N \frac{(UC_i)(PSR_i)}{NSRU_i}}_{\text{SRU Depot Pipeline Spares}} + \underbrace{\sum_{i=1}^N \frac{(UC_i)(PSR_i)}{NSRU_i}}_{\text{SRU Replacement Spares}}$$

AFH = annual force flying hours

M = number of operating base locations

PIUP = operational service life of the weapon system in years (Program Inventory Usage Period)

STKL = number of LRU spares required for each base to fill the base repair pipelines including a safety stock to protect against random fluctuations in demand

STKS = number of SRU spares required for each base . . . (see STKL above)

UC = expected unit cost of LRU at the time of initial provisioning

NSRU = number of different SRUs

PFFH = Peak Force Flying Hours on an annual basis per base

OPA = quantity of like units within the parent system (Quantity Per Application)

UF = ratio of the operating hours to the flying hours for the unit (Use Factor)

DCRT = average Depot Repair Cycle Time in years

NRTS = percentage of units entering shop that must be sent to the depot for repair (Not Repairable This Station)

FCL = fraction of removed LRUs expected to result in condemnation at the base level

FCS = fraction of removed SRUs expected to result in condemnation at the base level

MTBMA = Mean Time Between Maintenance Actions

PSR = probability of repairing an LRU, given that it enters the shop

i = subscript identifying jth LRU (where 1, 2, . . . i, . . . , N)

N = number of different LRUs within the subsystem

ANNUAL COST OF FACILITIES, C_{FA}

$$C_{FA} = \frac{(M)(FB)}{PIUP}$$

M = number of operating base locations
 FB = total cost of new base facilities
 PIUP = operational service life of the weapon system in years (Program Inventory Usage Period)

ANNUAL COST OF AIRCREW, CAC

$$C_{AC} = \underbrace{(CPA)(OA)}_{\text{no. of crews}} \sum_{p=1}^P \underbrace{(ABPR_p + YOSR_p + BAO_p + ACI_p + BAS_p)}_{\text{cost of aircrewman}}$$

ABPR - annual base pay rate

YOSR - years of service pay adder

BAQ - basic allowance for quarters

ACI - aviation career incentive pay

BAS - basic allowance for subsistence

CPA - number of crews per aircraft

OA - number of operational aircraft in fleet

p - subscript identifying the pth member of the aircrew

P - number of members in aircrew

ANNUAL COST OF FUEL, C_{FL}

$$C_{FL} = \overbrace{(AFH)(EPA)(FR)}^{\text{fuel consumed}}(FC)$$

AFH = annual force flying hours
 EPA = number of engines per aircraft
 FR = fuel consumption rate of one engine in gallons per flying hour
 FC = fuel cost per gallon

ANNUAL COST OF ON-OFF EQUIPMENT MAINTENANCE, C_{EM}

$$C_{EM} = \sum_{n=1}^Y \sum_{m=1}^Z \frac{(\text{AFH})(\text{MMH}_{mn})}{\text{EFF}} \underbrace{(\text{DLR}_n + \text{ILR}_n)}_{\text{Loaded Labor Rate}} + (\text{AFH})(\text{MAT}) \quad (.6)$$

EFF = percentage of maintenance manhours devoted to direct labor

AFH = annual force flying hours

MMH = maintenance manhours per flight hour

DLR = direct labor rate

ILR = indirect labor rate

MAT = material costs (\$115.91/FH)

m = subscript identifying mth group of identical subsystems (where 1, 2, 3, . . . m . . . Z)

Z = number of different subsystems in the system

n = subscript identifying nth particular skill category and level (where 1, 2, . . . n . . . Y)

Y = number of different skill categories and levels

M = number of operating base locations

ANNUAL COST OF PERSONNEL TRAINING, C_{PT}

$$C_{PT} = \sum_{n=1}^Y \sum_{m=1}^Z \left(\frac{1}{PIUP} + TRS_n \right) \underbrace{\frac{(AFH)(MMH_{mn})}{PMB}}_{\text{manpower utilization}} + TCS_n + \underbrace{\frac{NRTC}{PIUP}}_{\text{nonrecurring training}}$$

PIUP = operational service life of the weapon system in years (Program Inventory Usage Period)

TRS = annual turnover rate of airmen in each skill category and level

AFH = annual force flying hours

MMH = maintenance manhours per flight hour

PMB = direct productive manhours per man per year at base level

TCS = cost of training an airman for each skill category and level

NRTC = non-recurring training costs

m = subscript identifying the mth subsystem (where 1, 2, 3, . . . m, . . . Z)

Z = number of different subsystems in the system

n = subscript identifying nth particular skill category and level (where 1, 2, . . . n, . . . Y)

Y = number of different skill categories and levels

ANNUAL COST OF DEPOT REPAIR, C_{DR}

$$C_{DR} = \sum_{i=1}^N \underbrace{\frac{(AFH)(OPA_i)(UF_i)(NRTS_i)}{MTBMA_i}}_{\text{number of depot repairs}} (DC_i + TC_i)$$

AFH = annual force flying hours

OPA = quantity of like LRUs within parent system (quantity per application)

NRTS = fraction of removed LRUs expected to be returned to depot for repair

UF = ratio of operating hours to flying hours for the LRU (use factor)

MTBMA = mean time between maintenance action

DC = depot repair cost for LRU or its SRUs

i = subscript identifying ith LRU (where 1, 2, . . . i . . . N)

N = number of different LRUs within the system

TC = roundtrip transportation & packaging cost

ANNUAL COST OF INVENTORY MANAGEMENT, C_{IM}

$$C_{IM} = \frac{IMC}{PIUP} + RMC \sum_{i=1}^N \underbrace{(1 + PA_i + PP_i)}_{\text{new USAF inventory items}} + (M)(SA) \sum_{i=1}^N \underbrace{(1 + PA_i + PP_i + SP_i)}_{\text{base-level inventory items}}$$

IMC = Initial management cost to introduce a new line item of supply (assembly or piece part) into the Air Force inventory

PIUP = operational service life of the weapon system in years (program inventory usage period)

RMC = annual management cost to maintain a line item of supply (assembly or piece part) in the wholesale inventory system

PA = number of new "p" coded repairable assemblies within the LRU (\$104.20/yr)

PP = number of new "p" coded consumable items within the LRU

M = number of operating base locations

SA = annual base supply line item inventory management cost (\$20.20/yr)

SP = number of standard (already stock-numbered) parts within the LRU which will be managed for the first time at bases where this system is deployed

i = subscript identifying ith LRU (where 1, 2, . . . i, . . . N)

N = number of different LRUs within the system

ANNUAL COST OF SOFTWARE SUPPORT, CSW

$$CSW = SS/PIUP + NSS [SLR + CUR \cdot CC]$$

NSS = average number of software support staff

SLR = software staff labor rate

CUR = support computer utilization rate

CC = support computer cost

SS = support software development cost

A-VII AMST¹ UNIQUE DATA (CONCEPTUAL PHASE)

AMST UNIQUE DATA

SCHEDULE/GROWTH

Date	Event	TNG SQ	OPS SQ	CONUS Location		O/S Location	
				No.	Sq/Loc	No.	Sq/Loc
APR78	MED Decision	-	-	-	-	-	-
APR80	Prod. Decision	-	-	-	-	-	-
OCT83	First Del.	0	0	0	0	0	0
OCT84	(4 A/C)	0	0	0	0	0	0
OCT85	IOC (16 A/C)	1	0	1	1	0	0
OCT86	(100 A/C)	1	5	2	2	1	2
OCT87	(200 A/C)	1	10	3	3	1	2
OCT88	FOC (300 A/C)	1	16	4	3	2	2

¹Advanced Medium STOL Transport

AMST UNIQUE DATA (continued)

AIRCRAFT/CREW BUILDUP*

Fiscal Year	Production		Avg. No. A/C Avail.		Total A/C End Year		Fly Time/Year		Total Crew
	A/C	Crew	UE	NOA	UE	NOA	UE	NOA	
FY84	4	6-1	0	2	0	4	0	780	6-1
FY85	16	12-1 8-0	2	10	4	16	780	3900	18-1 8-0
FY86	80	6-1 152-0	42	18	80	20	16380	7020	24-1 160-0
FY87	100	180-0	125	25	170	30	48750	9750	24-1 340-0
FY88	100	172-0	213	37	256	44	83070	14430	24-1 512-0
FY89 03	-	60	256	44	256	44	99840	17160	14-1 512-0

*Utilization Rate: 5 day/week; 1.5 hrs./day.

CREW DATA*

Position	AFSC	Rank	YOS	Other	Other
Pilot		O-3	12		
Copilot		O-2	4		
Navigator		O-2	4		
Loadmaster		E-5	6		
Crew Chief		E-5	8		

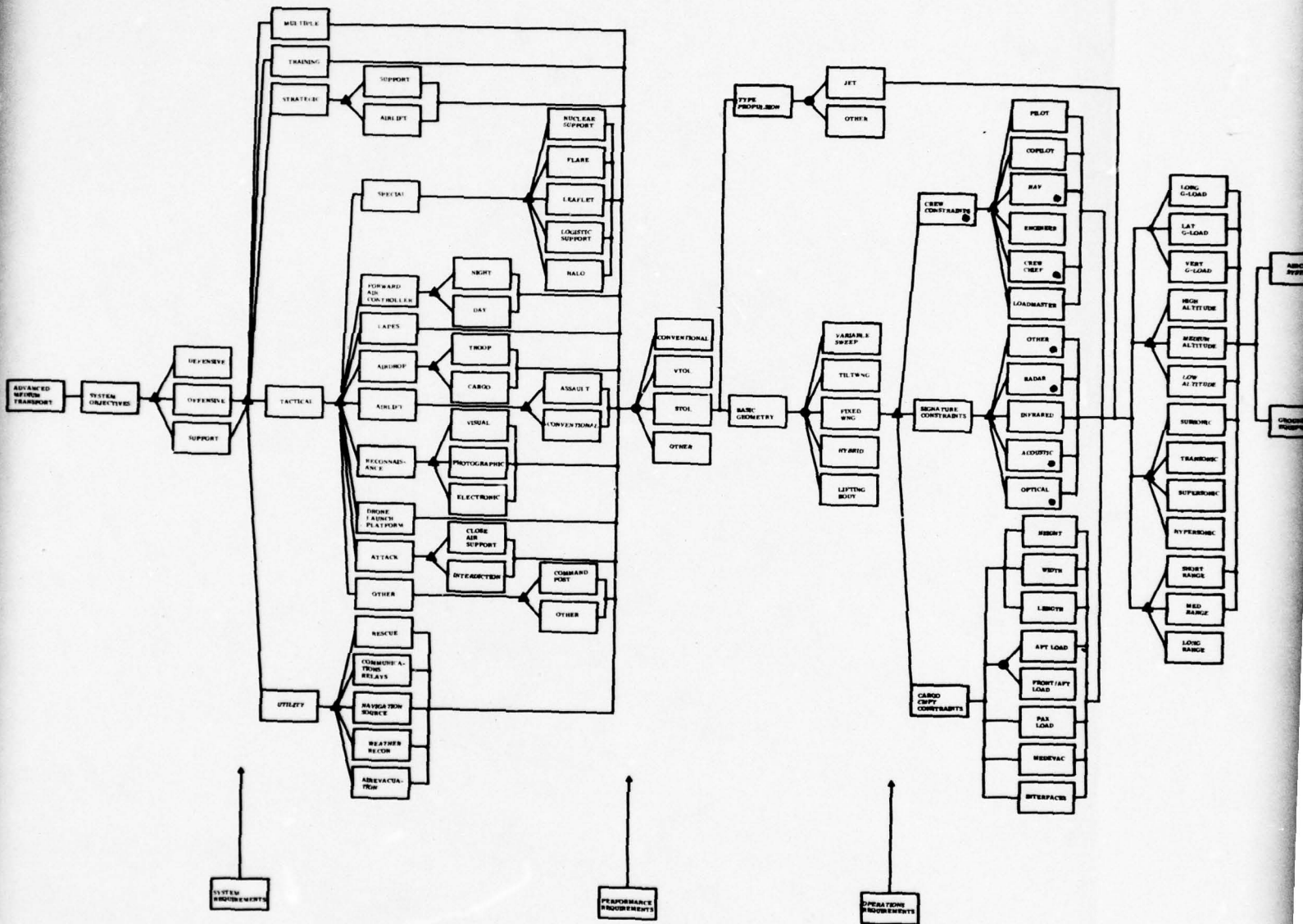
*Crews/OPS Sq = 32, Crews/TNG Sq - See Aircraft/Crew Buildup, Add 10% overhead each squadron only.

**A-VIII. DESIGN OPTION DECISION TREES
AND ALTERNATIVE LISTING
(VALIDATION PHASE)**

This section contains the three Design Option Decision Trees for the AMST System, the AMST Avionics, and the AMST Landing Gear. A full set of design option decision trees detailing both avionics and landing gear will be provided in a follow-on report. That report will document the results of the demonstration of the Coordinated Human Resource Technology during the full-scale development phase.

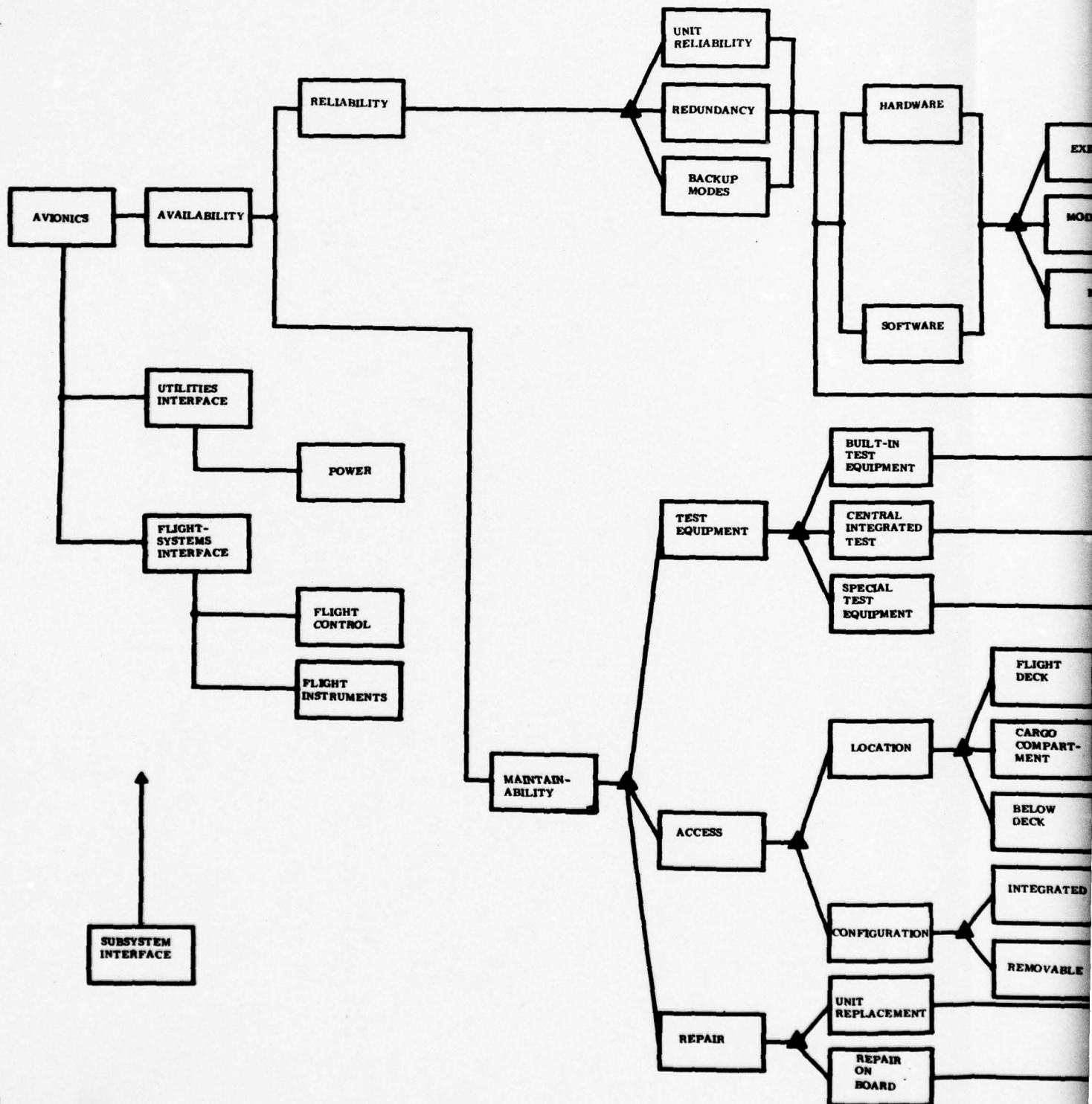
ALTERNATIVE LISTING
MAINTENANCE/OPERATIONS/SUPPORT

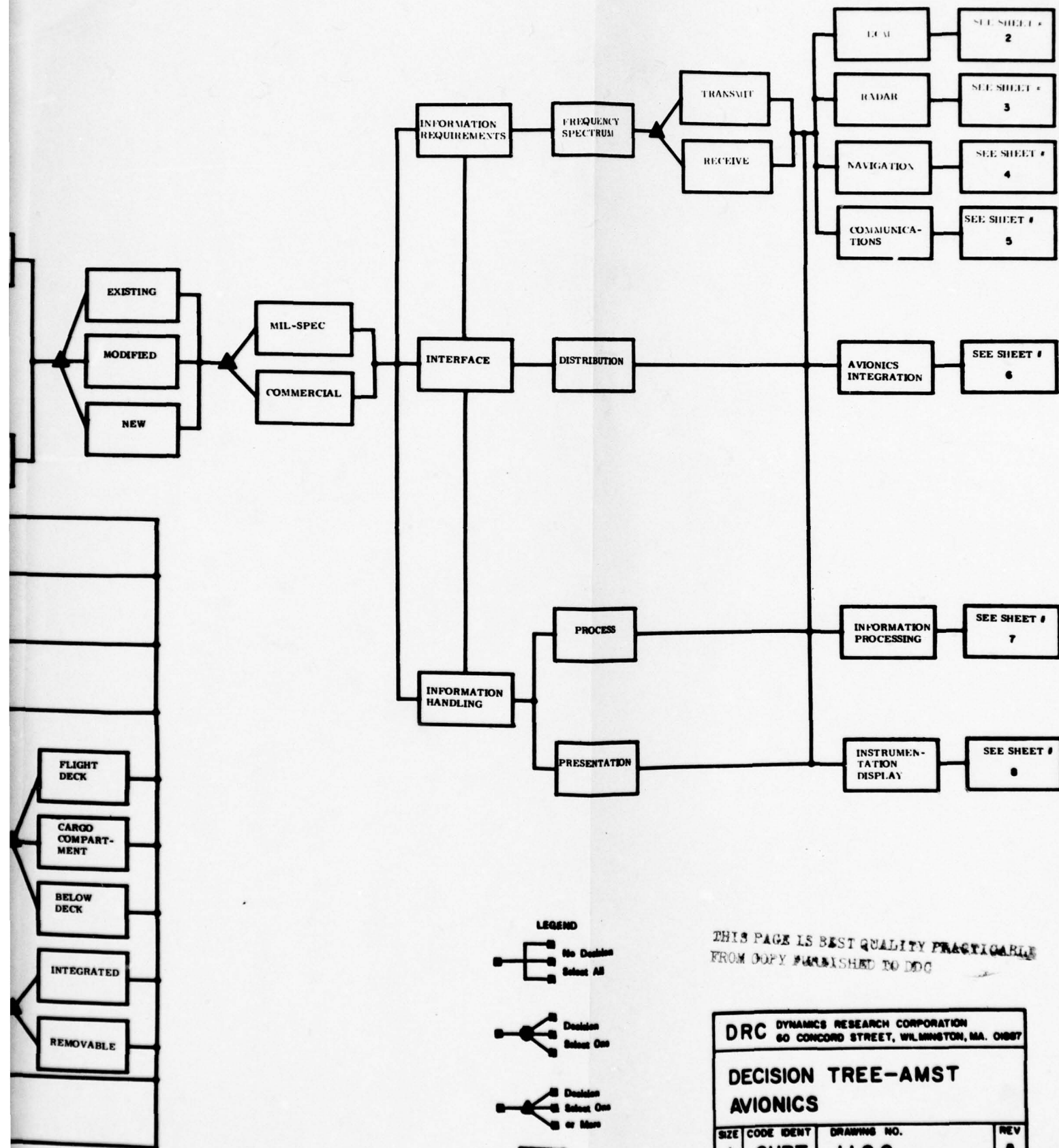
1. TWO-MAN VS. THREE-MAN FLIGHT DECK
2. CONVENTIONAL SUPPORT EQUIPMENT VS. BUILT-IN TEST
3. LIMITED ADVERSE WEATHER AERIAL DELIVERY SYSTEM (AWADS) AND ECM
4. CONVENTIONAL VS. TASK ORIENTED ISD/JGD
5. RADIUS OF ACTION
6. PAYLOAD
7. STOL FIELD LENGTH
8. RUNWAY QUALITY



47-48

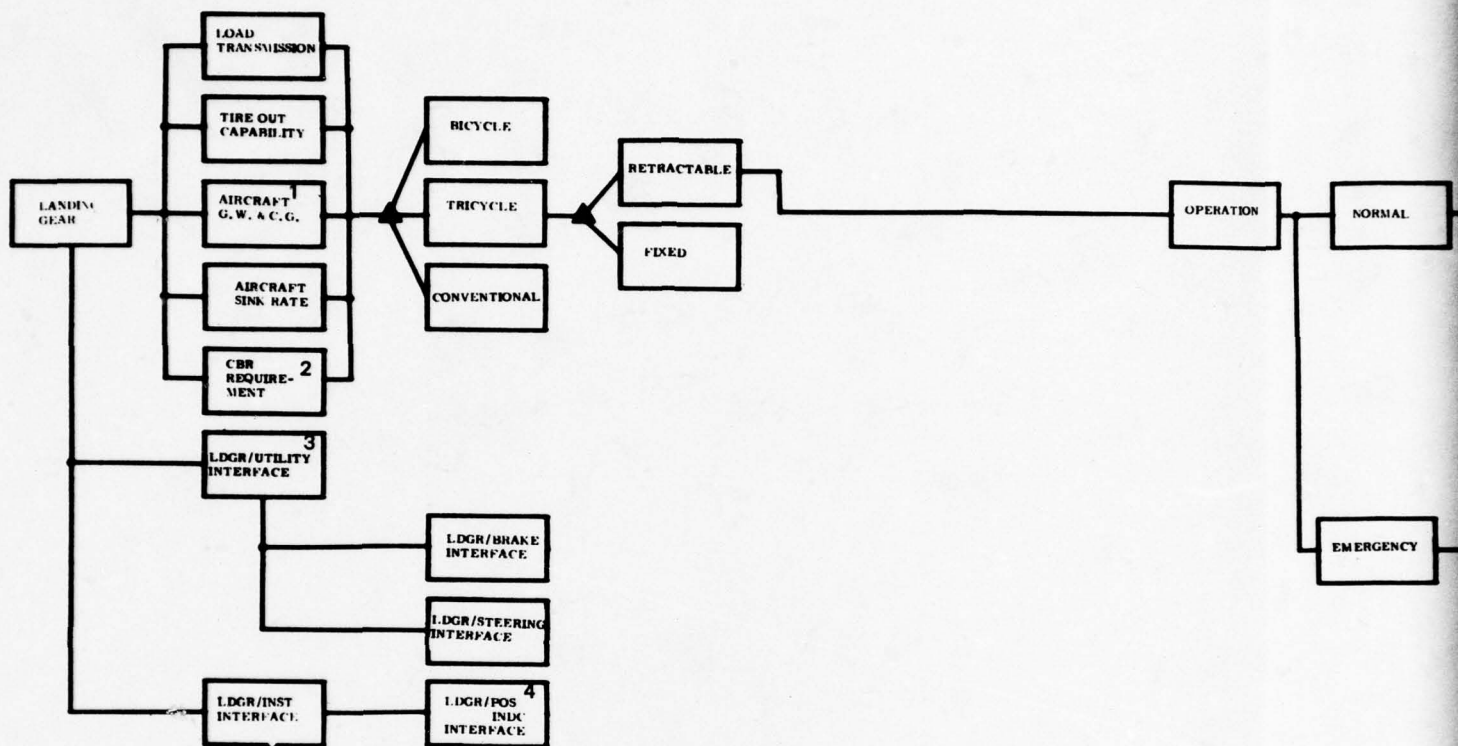
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DRC DYNAMICS RESEARCH CORPORATION 60 CONCORD STREET, WILMINGTON, MA. 01897			
DECISION TREE-AMST AVIONICS			
SIZE	CODE IDENT	DRAWING NO.	REV
J	CHRT	1100	A
SCALE: NONE		29 MARCH 1979	SHEET 1 OF 8

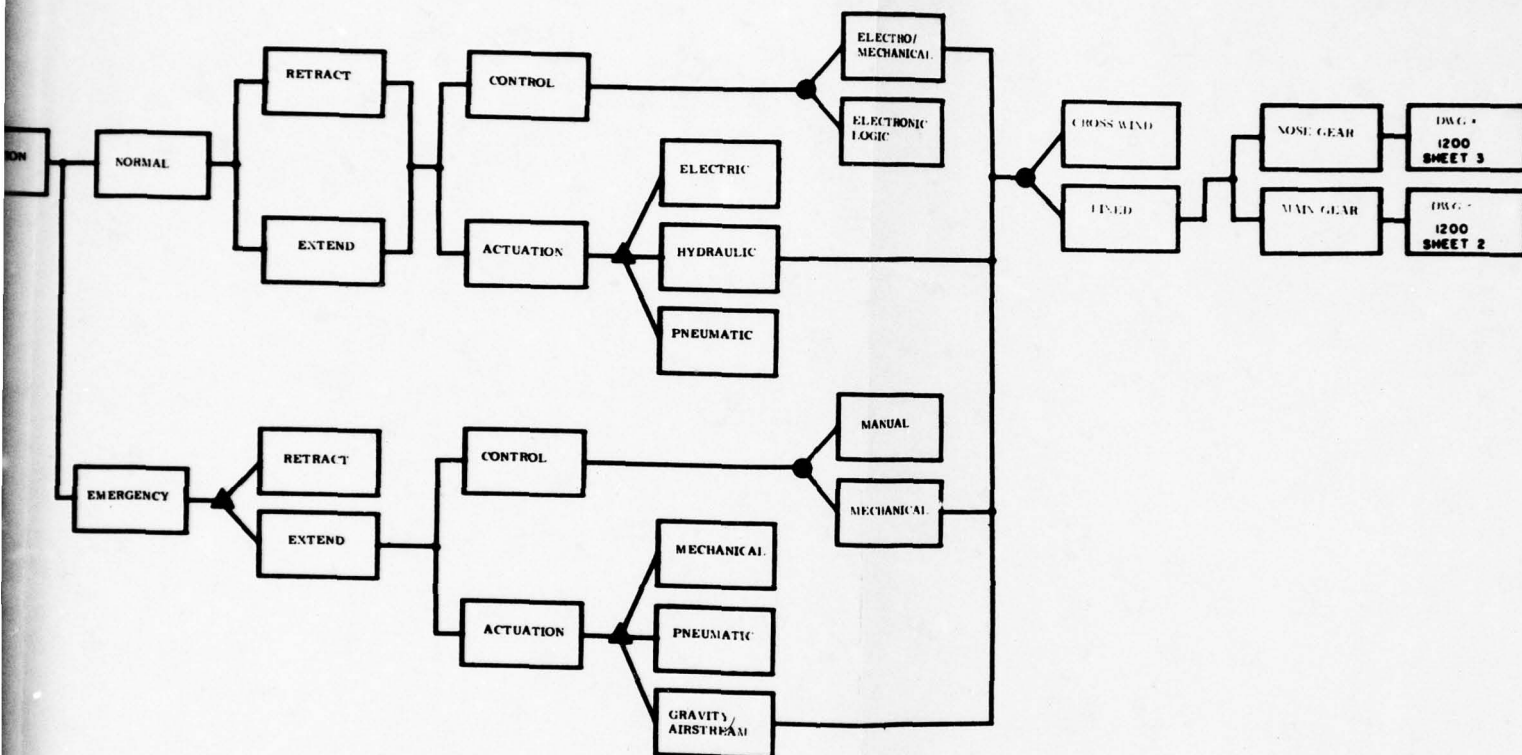


¹Gross Weight and Center of Gravity

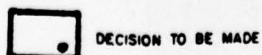
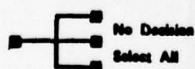
²California Bearing Ratio

³Landing Gear

⁴Position Indicator



LEGEND



DRC DYNAMICS RESEARCH CORPORATION 60 CONCORD STREET, WILMINGTON, MA. 01887			
DECISION TREE-AMST LANDING GEAR			
SIZE	CODE IDENT	DRAWING NO.	REV
J	CHRT	1200	A
SCALE: NONE		25 MARCH 1978	SHEET 1 OF 3

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FROM COPY 1200 SHEET 3

**A-IX TECHNICAL MANUAL CONTENT ESTIMATES
AND ESTIMATING ALGORITHMS (VALIDATION PHASE)**

**TECH MANUAL CONTENT
LANDING GEAR - CONVENTIONAL**

Page Type	TS		NTS	
	F/L	Shop	F/L	Shop
narrative	97	51	62	192
half tone art	9	77	9	
half tone explosion	77		77	9
electronic line art				7
exploded line art				
fault isolation chart				
fault isolation schematic block		18		
access line art				
fault isolation schematic flow				7
fault isolation schematic mech/hyd		18		
job guide narrative				
job guide illustrations				

183 164 348 215

Subsystems 7
Assemblies 18
Subassemblies 154

TECH MANUAL CONTENT ESTIMATE
LANDING GEAR - TASK ORIENTED

Page Type	TS		NTS	
	F/L	Shop	F/L	Shop
narrative	77	51		192
half tone art		77		
half tone explosion				9
electronic line art				7
exploded line art				
fault isolation chart	175			
fault isolation schematic block		18		
access line art	154			7
fault isolation schematic flow				
fault isolation schematic mech/hyd	14	18		
job guide narrative			154	
job guide illustrations			154	

520 164 308 215

**A-IX TECHNICAL MANUAL CONTENT ESTIMATES
AND ESTIMATING ALGORITHMS (VALIDATION PHASE)**

**TECH MANUAL CONTENT
LANDING GEAR - CONVENTIONAL**

Page Type	TS		NTS	
	F/L	Shop	F/L	Shop
narrative	97	51	62	192
half tone art	9	77	9	
half tone explosion	77		77	9
electronic line art				7
exploded line art				
fault isolation chart				
fault isolation schematic block		18		
access line art				
fault isolation schematic flow				7
fault isolation schematic mech/hyd		18		
job guide narrative				
job guide illustrations				

183 164 348 215

Subsystems 7
Assemblies 18
Subassemblies 154

TECH MANUAL CONTENT ESTIMATE
LANDING GEAR - TASK ORIENTED

Page Type	TS		NTS	
	F/L	Shop	F/L	Shop
narrative	77	51		192
half tone art		77		
half tone explosion				9
electronic line art				7
exploded line art				
fault isolation chart	175			
fault isolation schematic block		18		
access line art	154			7
fault isolation schematic flow				
fault isolation schematic mech/hyd	14	18	154	
job guide narrative			154	
job guide illustrations				

520 164 308 215

TECH MANUAL CONTENT ESTIMATE
2MFD AVIONICS - CONVENTIONAL

Page Type	TS		NTS	
	F/L	Shop	F/L	Shop
narrative	107	267	162	928
half tone art	54	298	27	267
half tone explosion		267		27
electronic line art	54	1012		533
exploded line art		108		
fault isolation chart				
fault isolation schematic block				
access line art				
fault isolation schematic flow				
fault isolation schematic mech/hyd				
job guide narrative				
job guide illustrations				

215 1947 189 1738

Subsystems 26
LRUs 54
SRUs 479

TECH MANUAL CONTENT ESTIMATE
2MFD AVIONICS - TASK ORIENTED

Page Type	TS		NTS	
	F/L	Shop	F/L	Shop
narrative	27	267		928
half tone art		298		267
half tone explosion		267		27
electronic line art		1012		533
exploded line art		108		
fault isolation chart	160			
fault isolation schematic block	52			
access line art	108			
fault isolation schematic flow	54			
fault isolation schematic mech/hyd				
* job guide narrative			540	
* job guide illustrations			540	

401 1952 1080 1735

• 5 x 8 size

TECH MANUAL CONTENT ESTIMATE
3MFD AVIONICS - CONVENTIONAL

Page Type	TS		NTS	
	F/L	Shop	F/L	Shop
narrative	96	252	153	868
half tone art	51	278	25	252
half tone explosion		252		26
electronic line art	51	957		504
exploded line art		102		
fault isolation chart				
fault isolation schematic block				
access line art				
fault isolation schematic flow				
fault isolation schematic mech/hyd				
job guide narrative				
job guide illustrations				

198 1841 178 1640

Subsystems 20
LRUs 51
SRUs 433

TECH MANUAL CONTENT ESTIMATE
IDAMST - CONVENTIONAL

Page Type	TS		NTS	
	F/L	Shop	F/L	Shop
narrative	112	298	221	1010
half tone art	57		26	298
half tone explosion		298		29
electronic line art	57	1137		597
exploded line art				
fault isolation chart				
fault isolation schematic block				
access line art				
fault isolation schematic flow				
fault isolation schematic mech/hyd				
job guide narrative				
job guide illustrations				

226 2117 247 1934

Subsystems 26
LRUs 57
SRUs 540

TECH MANUAL CONTENT AND COST ALGORITHMS

CONVENTIONAL (DEDUCTIVE) MANUALS

LANDING GEAR - FLIGHTLINE

TROUBLESHOOTING:

Actions = 3 actions/subsystem + 1 action/subassembly
Pictorials = 1 pictorial/assembly + 1 pictorial/subassembly
Pages = 1/3 page/action
 + 1/4 page narrative/subassembly
 + 1/2 page/pictorial
Costs: /action page = /page narrative (I/D Text) = \$218.73
 /pictorial (half tone art) = \$152.98
 /pictorial (half tone explosion) = \$270.18
So: cost/subsystem = \$218.73
 cost/assembly = $1/3 \times 218.73 + 152.98$
 = \$225.89
 cost/subassembly = $1/4 \times 218.73 + 270.18$
 = \$324.86

NONTROUBLESHOOTING:

Actions = 5 actions/subassembly
Pictorials = 1 pictorial/subassembly + 1 pictorial/assembly
Pages = 1/4 page narrative/assembly
 + 1/3 page/action
 + 1/2 page/pictorial
Costs: /action-narrative page (I/D Text) = \$218.73
 /pictorial (half tone art) = \$152.98
 /pictorial (half tone exploded) = \$270.18
So: cost/assembly = $1/4 \times 218.73 + 152.98$
 = \$208.16
 cost/subassembly = $\$270.18 + 5/3 \times 218.73$
 = \$634.73

CONVENTIONAL (DEDUCTIVE) MANUALS (Cont.)

AVIONICS - FLIGHTLINE

TROUBLESHOOTING:

Actions = 2 actions/subsystem + 2 actions/LRU
Pictorials = 2 pictorials/LRU
Schematics = 1 schematic/LRU
Pages = 1/2 page/action + 1/2 page narrative/LRU
+ 1 page/schematic
+ 1/2 page/pictorial

Costs: /action page-narrative (I/D Text) = \$218.73
/pictorial (I/D half-tone art) = \$152.98
/schematic (electronic line art) = \$210.65

So: cost/subsystem = \$218.73
cost/LRU = $218.73 + 2 \times 152.98$
 $+ 109.37 + 210.65$
= \$844.71

NON-TROUBLESHOOTING:

Actions = 5 actions/LRU
Pictorials = 1 pictorial/LRU
Pages = 1/2 page/action
+ 1/2 page narrative/LRU
+ 1/2 page/pictorial

Costs: /action-narrative page (I/D Text) = \$218.73
/pictorial (I/D half-tone art) = 152.98

So: cost/LRU = $5/2 \times 218.73 + 152.98 + 109.37$
= \$809.17

CONVENTIONAL (DEDUCTIVE) MANUALS (Cont.)

DING GEAR - SHOP

TROUBLESHOOTING:

Actions = 1 action/subassembly
Pictorials = 1 pictorial/subassembly
Schematics = 2 schematics/assembly
Pages = 1/3 page/action
 + 1/2 page/pictorial
 + 1 page/schematic
Costs: /action page (I/D Text) = \$218.73
 /pictorial (half tone art) = \$152.98
 /schematic (F/I system black) = \$343.23
 /schematic (F/I system hud/mech) = \$592.93
So: cost/assembly = \$393.23 + 592.93
 = \$986.16
 cost/subassembly = \$371.71

NONTROUBLESHOOTING:

Actions = 3 actions/subassembly
Pictorials = 1 pictorial/assembly
Schematics = 1 schematic/subsystem
Flow Diagrams = 1 flow diagram/subsystem
Pages =
 + 1/4 page narrative/subassembly
 + 1/3 page/action
 + 1/2 page/pictorial
 + 1 page/schematic-flow diagram
Costs: /action-narrative page = (I/D Text) = \$218.73
 /pictorial (I/D half tone exploded) = \$270.18
 /schematic (electronic line art) = \$210.65
 / flow diagram (F/I schematic flow) = \$491.33
So: cost/subsystem = \$210.65 + 491.33
 = \$701.98
 cost/assembly = 1/4 x 218.73 + 270.18
 = \$324.86
 cost/subassembly = 1/4 x 218.73 + 218.73
 = \$273.41

CONVENTIONAL (DEDUCTIVE) MANUALS

AVIONICS - SHOP

TROUBLESHOOTING:

Actions = 1 action/LRU + 1 action/SRU
Pictorials = 3 pictorials/LRU + 2 pictorials/SRU
Schematics = 1 schematic/LRU + 2 schematics/SRU
Graphics = 1 graphic/LRU
Pages = 1/2 page/action
 + 1/2 page/pictorial
 + 1 page/schematic
 + 2 pages/graphic

Costs: /page action (I/D Text) = 218.73
 /pictorial (half-tone art) = \$152.98
 /pictorial (half-tone explosion) = \$270.18
 /schematic (electronic line art) = \$210.65
 /graphic (I/D/IPB exploded line art) = \$455.60

So: cost/LRU = $1/2 \times 218.73 + 2 \times 152.98 + 270.18 + 210.65 + 455.60$
 = \$1351.76
 cost/SRU = $1/2 \times 218.73 + 152.98 + 270.18 + 2 \times 210.65$
 = \$953.83

NON-TROUBLESHOOTING:

Actions = 6 actions/LRU + 2 actions/SRU
Pictorials = 2 pictorials/LRU + 1 pictorial/SRU
Schematics = 1 schematic/LRU + 1 schematic/SRU
Pages = 1/2 pg. narrative/LRU + 1/2 page narrative/SRU
 + 1/2 page/action
 + 1 page/schematic
 + 1/2 page/pictorial

Costs: /action-narrative page (I/D Text) = \$218.73
 /pictorial (I/D half-tone art) = \$152.98
 /pictorial (I/D exploded half-tone) = \$270.18
 /schematic (electronic line art) = \$210.65

So: cost/LRU = $3 \times 218.73 + 152.98 + 270.18 + 109.37 + 210.65$
 = \$1399.37
 cost/SRU = $218.73 + 152.98 + 210.65 + 109.37$
 = \$691.73

TASK ORIENTED (DIRECTIVE) MANUALS

LANDING GEAR - FLIGHTLINE

TROUBLESHOOTING:

Actions = 3 actions/subsystem + 1 action/subassembly
Schematics = 1 schematic/subsystem
Pictorials = 1 pictorial/subassembly
Pages = 1 page/action
+ 1/2 page narrative/subassembly
+ 1 page/pictorial
+ 2 pages/schematic

Costs: /action page (FI chart) = \$298.68
/narrative page (I/D Text) = 218.73
/pictorial (FR/FI access line art) = \$383.98
/schematic (FI schematic mech/hyd) = 592.93

So: cost/subsystem = $3 \times 298.68 + 592.93$
= 1488.97
cost/subassembly = $\$298.68 + 383.98 + 1/2$
+ 218.73
= 682.66 + 109.37
= \$792.03

NON-TROUBLESHOOTING:

Actions = 5 actions/subassembly
Pictorials = 2 pictorials/action
Pages = 2 pages/action
+ 1 page/pictorial

Costs: /action page (JG Text) = \$120.36
/pictorial (JG Illus. -Repeat) = 149.94

So: cost/subassembly = $(5 \times 2 \times 120.36)$
+ $(5 \times 2 \times 149.94)$
= \$2703.00

TASK ORIENTED (DIRECTIVE) MANUALS (Cont.)

AVIONICS - FLIGHTLINE

TROUBLESHOOTING:

Actions = 2 actions/subsystem + 2 actions/LRU
Pictorials = 2 pictorials/LRU
Schematics = 1 schematic/subsystem
1 schematic/LRU
Pages = 1 page/action
+ 1/2 page narrative/LRU
+ 1 page/schematic (LRU)
+ 1 page/pictorial
+ 2 pages/schematic (subsystem)

Costs: /action page (FI Chart) = \$298.68
/narrative page (I/D Text) = \$218.73
/pictorial (FR/FI Access Line Art) = \$383.98
/schematic (Block-electronic Line Art) = \$161.80
/schematic (FI Schematic Flow) = \$491.33

So:

cost/LRU = $298.68 + 1/2 \times 218.73 + 2 \times 383.98 + 491.33$
= \$1667.34
cost/subsystem = $2 \times 298.68 + 161.80$
= \$597.36 + 161.80
= \$739.16

NON-TROUBLESHOOTING:

Actions = 5 actions/LRU
Pictorials = 2 pictorials/action
Pages = 2 pages/action
+ 1 page/pictorial

Cost: /action page (JG Tone) = \$120.36
/pictorial (JG Illus. Reports) = \$146.94

So: cost/LRU = $10 \times 120.36 + 10 \times 146.94$
= \$2703.00

SHOP - Directive manuals have not been considered for SHOP at the present time. Conventional algorithms should be used.

Page Type	Cost Area	Writer	Editor	Illustrator	Typist	Proof Reading	Parts Catalog	Production	Q/A	Supervisory	Total Material	Total Hours DL & Mnt 8
IPB Half Tone Art		68.50	7.40	66.60	64.90		9.0	68.10	68.10	911.80	15.00	19.1
			1.0	8.0			59.40	0.7	0.5	0.9		152.54
			7.40	52.80				4.27	3.06	10.62		
I/D/IPB Sectional Link Art	2.0	19.00		18.0		1.0	2.0			1.25	3.00	26.45
				118.80		4.80	13.20			14.75		186.07
I/D/IPB Cutaway Line Art				10.0			2.0			0.85		18.05
				66.00			13.20			10.03		130.55
I/D/IPB Explosion Line Art	4.0	38.00		24.0			4.0	1.25		1.8		37.55
				158.40			26.40	7.63		21.24		286.72
Schematic/ Electronic Line Art	2.0	19.00		12.0				0.7		0.8		17.0
				79.20				4.27		9.44		125.36
Block Dia./ Electronic Line Art				8.0						0.6		12.8
				52.80						7.08		96.60
Test Setup Electronic Line Art				8.0						0.6		12.8
				52.80						7.08		96.60
Wiring Dia. Electronic	2.0	19.00	1.0	8.0				0.7	0.5	0.6		12.8
			7.40	52.80				4.27	3.06	7.08		96.60
1-Fold Line Art				8.0	See Notes 5 & 6					0.6		12.8
				52.80						7.08		96.60
2-Fold Line Art				16.0						1.0		21.2
				108.60						11.80		168.62
3-Fold Line Art				24.0						1.4		28.6
				158.40						16.52		222.14
4-Fold Line Art				32.0						1.8		38.0
				211.20						21.24		282.91
5-Fold Line Art				40.0						2.2		46.4
				284.00						25.96		344.88
IPB Tabular	See Note 7				2.0		14.0			0.85		18.05
					9.00		92.40			10.03		121.75

PAGE TYPE - COST AND DIRECT LABOR DATA

Page Type	Cort Area	Writer	Editor	Illustrator	Typist	Proof Reading	Parts Cataloging	Production	Q/A	Supervisory	Total Material	Total Hours DL & Mat
Job Guide		60.50	67.40	66.60	64.90			66.10	66.10	66.10	3.00	8.05
Text Note 1		5.0 47.50	1.0 7.40	0.1 .66	0.7 3.43	0.25 1.15	See Note 2	0.5 3.05	0.1 .61	0.4 4.72	3.00	71.52
Job Guide Illustration (no repeats)				8.0 52.80	See Note 3					0.7 8.26	5.00	15.3 124.62
Job Guide Illustration (repeats)				3.0 19.80						0.5 5.90	7.00	10.1 91.26
Fault Description Chart		12.0 114.00	1.0 7.40	4.0 26.40	1.5 6.75			0.7 4.27	0.5 3.05	1.0 11.80	3.00	20.7 176.67
FR/FI Access Line Art	1	7.0 66.50		16.0 105.60	See Note 8					1.2 19.16	43.00	26.4 248.98
Fault Isolation (FI) Chart		12.0 114.00		4.0 26.40	1.5 6.75	See Note 10				1.0 11.80	3.00	20.7 176.67
FI System Schematic/Block Diagram		9.5 90.25		16.0 105.60	See Note 9					1.4 16.52	8.50	29.1 235.59
FI System Schematic/Flow Diagram				24.0 158.40						1.8 21.24	8.50	37.5 293.11
FI System Schematic				32.0 211.20						2.5 29.5	8.50	46.2 354.17
Mech. Diagram												
FI System Schematic/Hydraulic											8.50	46.2 354.17
FR/FI Access Line Art	2	7.0 66.50			See Note 8						3.00	51.7 274.92
Intermediate/Depot Text		9.5 90.25	1.0 7.40	0.15 .99	1.5 7.35	0.5 2.30	See Note 4	1.25 7.63	0.5 3.06	0.7 8.26	3.00	15.1 130.23
Intermediate/Depot Tabular (I/D)		9.5 90.25		0.5 3.30	3.0 14.70	0.5 2.30	See Note 4	1.25 7.63		0.8 9.44	3.00	17.05 141.07
I/D Half Title Art		3.0 28.50		6.0 39.60				0.7 4.27		0.5 5.90		10.7 103.27
I/D Half Title		7.0 66.50		10.0 66.00				0.7 4.27		0.9 10.82	15.00	18.1 172.84
Explosion												

PAGE TYPE - COST AND DIRECT LABOR DATA

Note 1- Title pages, list of effective pages, etc., are treated as text pages. The writer produces them as part of the total pages assigned to him. The management information reporting system records the hours spent per assignment and the total pages produced. Thus the production rate is total hours divided by total pages to express hours per page.

Note 2- IPB data are regarded as being available in copy form. Since IPBs are a separate contract item all charges are accumulated against them and no charge for reuse is included in job guide costs. If there were no IPB, there could be additional costs.

Note 3- The illustrating costs are based on the premise that contractors have an engineering drawing effort which produces 3-D drawings for control of manufacturing and assembly and that only conversion costs are required to convert this source data to job guide use. Two to two-and-one-half hours per view are required to develop job guide illustrations. The typical job guide illustration averages three views. The reuse ratio is approximately 4 to 1.

Note 4- Prices of pages do not include front end analysis but do include engineering liaison, validation, and verification.

Note 5- MIL-M-83495 envisions that this type of drawing will be a category E drawing per MIL-STD-863 and that its development costs are chargeable to Engineering Development rather than to T.O. development. If this is possible in any corporation the drafting costs can be omitted. However, the scaling of category E drawings for microfilming and the letter sizes specified are not conducive to legibility and size requirements in Technical Orders. In addition, most corporations are not geared up for the one-drawing system. In virtually all cases no engineer-writer effort should be required for these drawings. The exception is where category E drawings are used, they must be reviewed by the editor.

Note 6- Prices of multi-fold drawings are not the per page prices. A fold is an 8-1/2 x 11 unit. Each multifold drawing must be printed with a blank apron (although sometimes it includes legends or tables) and this apron must be added to obtain the total folds or "pages." The apron is counted because it entails production and material costs. Thus a 1-fold drawing is two pages; a 2-fold drawing is three pages; a 3-fold drawing is four pages; a 4-fold drawing is five pages; and a 5-fold drawing is six pages. The maximum

length of 5-folds (six pages) is determined by printing press capacity. Thus the per page cost of multifold drawings must be obtained by dividing the total cost by the equivalent number of pages.

Note 7- The typical IPB tabular page contains approximately 35 parts and attaching part listings. Each listing costs about 0.4 hour. While a page can accommodate up to 50 listings, the limit is imposed by the number of parts one can portray in the facing IPB illustration.

Note 8- Prices are predicated on the use of photographs from which the several views can be traced. In many cases photographs cannot be taken and used for this purpose and engineering drawings must be used as source material. For this situation see the alternate pricing which the last item in the pricing matrix (end of pricing list).

Note 9- Material costs (which are repro negative costs) are given for 2-fold drawings. For additional folds, use the material costs for multifold drawings listed at the top of the sheet.

Note 10- If no front end analysis has been done prior to start of technical order production, the engineer-writer may acquire as much as 24 hours per Fault Isolation page.

A-X.

S A M P L E

PERSONNEL, TRAINING AND JOB GUIDE
SECTION
OF THE
INTEGRATED LOGISTICS SUPPORT PLAN
FOR THE
ADVANCED MEDIUM STOL TRANSPORT
(AVIONICS AND LANDING GEAR)

15 July 1978

Prepared by:
Dynamics Research Corporation
60 Concord Street
Wilmington, MA 01887

Contract No. F33615-75-C-5218

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PERSONNEL, TRAINING AND JOB GUIDE PLAN

1.0 GENERAL

This Personnel, Training and Job Guide Plan describes the personnel requirements, training program and job guide documentation necessary for accomplishing the timely and effective support of the Advanced Medium STOL Transport (AMST) production, deployment and transition to the operational phase. Complete and detailed information relative to the total training and job guide development program will be available after an integrated requirement and task analysis (IRTA) is complete. The purpose of this IRTA is to create coordinated training and job guide products by methodically identifying maintenance and operator tasks and then determining to what extent they will be covered in either training or documentation. The major activity here will be directed toward the maintenance area.

This initial information relative to the quantitative and qualitative manning requirements for the AMST has been determined utilizing the coordinated human resource technology (CHRT). ATC¹ and MAC² will determine maintenance training and training equipment requirements utilizing the results of the IRTA. All training equipment requirements will be forwarded to the AMST SPO³ who will review, secure, validate and procure the related training equipment. The scope of information covered in the job guide documentation shall be determined also utilizing the results of the IRTA. Job guide documentation shall be procured for

PERSONNEL, TRAINING AND JOB GUIDE PLAN

the organizational, intermediate, and depot levels in accordance with MIL-M-83495, MIL-M-25393A, and MIL-M-38789A, respectively.

The major decision yet to be made in the personnel, training and job guide area is the selection of either the traditional or task oriented approach toward selecting and qualifying personnel. This must be determined so that it may correctly be reflected in the IRTA.

¹ Air Training Command

² Military Air Command

³ System Program Office

2.0 THE INTEGRATED REQUIREMENTS AND TASK ANALYSIS

An integrated requirements and task analysis (IRTA) shall be performed by the contractor in order to develop a coordinated personnel, training and job guide program. The Air Force must select either a traditional or task oriented approach to personnel selection and qualification and provide this information to the contractor so that he may reflect it in the IRTA. The Air Force shall closely monitor and participate in the IRTA. The result shall be a deliverable document, a Task Identification Matrix. This document shall identify task versus equipment, maintenance level at which task occurs, where task information is provided (in training, job guide, or both) and spares approach to equipment items.

Upon review of the Task Identification Matrix, the Air Force shall determine the scope and content of the training and job guide effort.

Task Intensity Matrices are attached for avionics and landing gear. They are the validation phase forerunner of the task identification matrices. These Task Intensity Matrices show the intensity with which information should be presented to the maintenance man and by what means i. e. training/ job guide. A diagonal notation is used to present two numerical values for training (head)/job guide (book). Numerical values range from 1-3 and are interpreted as follows:

- 1 - Light coverage
- 2 - Normal coverage
- 3 - Heavy coverage

The Task Intensity Matrix reflects the basic ISD¹/JGD² approach from which the task intensity data was obtained. The information presented in this matrix may be used for planning purposes such as establishing job guide level of detail, identifying additional job aids, simulators or mockups and broadening or reducing specialty and/or technical training requirements.

¹Instructional System Development

²Job Guide Development

WRT DEMO - MODIFIED AMST LANDING GEAR, VALIDATION PHASE -- T.O.T.

* TASK INTENSITY MATRIX *

		FLIGHTLINE NONTROUBLESHOOT	FLIGHTLINE TROUBLESHOOT	SHOP REPAIR	
***** * EQUIPMENT * *****					
GL3110	I	2 /	2 /		4 /
	I	/ 2	/ 3		/ 8
GL3111	I			2 /	
	I			/ 2	
GL3112	I			2 /	
	I			/ 2	
GL3119	I			2 /	
	I			/ 2	

GL3120	I	2 /	2 /		4 /
	I	/ 2	/ 3		/ 8
GL3121	I			2 /	
	I			/ 2	
GL3122	I			2 /	
	I			/ 2	
GL3129	I			2 /	
	I			/ 2	

GL3130	I	1 /	2 /		4 /
	I	/ 3	/ 3		/ 8
GL3131	I			1 /	
	I			/ 3	
GL3139	I			2 /	
	I			/ 2	

GL3140	I	3 /	3 /		4 /
	I	/ 1	/ 3		/ 8
GL3141	I			2 /	
	I			/ 1	
GL3142	I			1 /	
	I			/ 2	
GL3149	I			2 /	
	I			/ 2	

GL3150	I	2 /	2 /		4 /
	I	/ 2	/ 3		/ 8
GL3151	I			2 /	
	I			/ 2	
GL3159	I			2 /	
	I			/ 2	

GL3160	I	2 /	1 /		4 /
	I	/ 2	/ 3		/ 8
GL3161	I			2 /	
	I			/ 2	

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FROM COPY MANUSCRIPT TO DDC

SL3170	I	2 /	1 /	4 /
	I	/ 2	/ 3	/ B
SL3171	I			3 /
	I			/ 1
SL3172	I			2 /
	I			/ 2
SL3173	I			3 /
	I			/ 1
SL3174	I			2 /
	I			/ 2

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CHART DEMO - AMST AVIONICS 2-MAN CREW, VALIDATION PHASE -- T.O.T.

* TASK INTENSITY MATRIX *

		FLIGHTLINE TROUBLESHOOT	FLIGHTLINE TROUBLESHOOT	SHOP REPAIR	

* EQUIPMENT *					

FAC110	I	2 /	3 /		4 /
	I	/ 2	/ 3		/ 8
FAC111	I			2 /	
	I			/ 2	
FAC112	I			2 /	
	I			/ 2	
FAC113	I			1 /	
	I			/ 3	
FAC114	I			2 /	
	I			/ 2	
FAC115	I			2 /	
	I			/ 2	
FAC116	I			1 /	
	I			/ 3	

DAC210	I	2 /	1 /		1 /
	I	/ 2	/ 3		/ 8
DAC213	I			2 /	
	I			/ 2	

DAC220	I	2 /	2 /		1 /
	I	/ 2	/ 3		/ 8
DAC221	I			2 /	
	I			/ 2	

DAC320	I	2 /	2 /		1 /
	I	/ 2	/ 3		/ 8
DAC321	I			2 /	
	I			/ 2	
DAC324	I			1 /	
	I			/ 3	

DAC330	I	2 /	1 /		1 /
	I	/ 2	/ 3		/ 8
DAC331	I			1 /	
	I			/ 3	

DAC410	I	3 /	3 /		1 /
	I	/ 1	/ 3		/ 8
DAC414	I			3 /	
	I			/ 1	
DAC415	I			2 /	
	I			/ 2	

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99Y210	I	2 /	1 /	4 /
99Y211	I	/ 2	/ 3	/ 8
	I		2 /	
	I		/ 2	
09Y230	I	2 /	3 /	4 /
09Y231	I	/ 2	/ 3	/ 8
09Y232	I		1 /	
	I		/ 3	
	I		1 /	
	I		/ 3	
59Y240	I	2 /	3 /	4 /
59Y241	I	/ 2	/ 3	/ 8
59Y242	I		2 /	
	I		/ 2	
	I		2 /	
	I		/ 2	
09Y250	I	2 /	2 /	4 /
09Y251	I	/ 2	/ 3	/ 8
09Y252	I		3 /	
	I		/ 1	
	I		2 /	
	I		/ 2	
T9Y330	I	2 /	2 /	4 /
T9Y332	I	/ 2	/ 3	/ 8
T9Y333	I		2 /	
T9Y334	I		/ 2	
T9Y335	I		2 /	
	I		/ 2	
	I		1 /	
	I		/ 3	
99Y350	I	2 /	3 /	4 /
99Y351	I	/ 2	/ 3	/ 8
99Y352	I		2 /	
	I		/ 2	
X9X110	I	2 /	2 /	4 /
X9X111	I	/ 2	/ 3	/ 8
X9X112	I		1 /	
X9X113	I		/ 3	
X9X114	I		2 /	
	I		/ 2	

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FROM COPY FURNISHED TO DDC

D9C420	I	2 /	2 /	4 /
	I	/ 2	/ 3	/ 8
D9C421	I		2 /	
	I		/ 2	
D9C422	I		2 /	
	I		/ 2	
D9C510	I	1 /	2 /	4 /
	I	/ 3	/ 3	/ 8
D9C512	I		2 /	
	I		/ 2	
D9C513	I		2 /	
	I		/ 2	
B9C520	I	2 /	3 /	4 /
	I	/ 2	/ 3	/ 8
B9C521	I		3 /	
	I		/ 1	
9C520	I	1 /	1 /	4 /
	I	/ 3	/ 3	/ 8
9C521	I		2 /	
	I		/ 2	
D9C710	I	2 /	2 /	4 /
	I	/ 2	/ 3	/ 8
D9C711	I		2 /	
	I		/ 2	
D9C712	I		2 /	
	I		/ 2	
D9C713	I		2 /	
	I		/ 2	
D9C714	I		1 /	
	I		/ 3	
D9C715	I		1 /	
	I		/ 3	
29N120	I	1 /	1 /	4 /
	I	/ 3	/ 3	/ 8
29N121	I		1 /	
	I		/ 3	
29N130	I	1 /	2 /	4 /
	I	/ 3	/ 3	/ 8
29N131	I		1 /	
	I		/ 3	
29N132	I		2 /	
	I		/ 2	
29N140	I	1 /	2 /	4 /
	I	/ 3	/ 3	/ 8
29N141	I		2 /	
	I		/ 2	
29N142	I		2 /	
	I		/ 2	
29N143	I		2 /	
	I		/ 2	

WFX120	I	2 /	2 /	4 /
	I	/ 2	/ 3	/ 8
WFX121	I		1 /	
	I		/ 3	
WFX122	I		2 /	
	I		/ 2	
WFX123	I		2 /	
	I		/ 2	
WFX124	I		2 /	
	I		/ 2	
<hr/>				
QFX130	I	2 /	2 /	4 /
	I	/ 2	/ 3	/ 8
QFX131	I		2 /	
	I		/ 2	
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RFY110	I	2 /	3 /	4 /
	I	/ 2	/ 3	/ 8
RFY111	I		2 /	
	I		/ 2	
RFY112	I		2 /	
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RFZ150	I	2 /	1 /	4 /
	I	/ 2	/ 3	/ 8
RFZ151	I		2 /	
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RFZ150	I	1 /	2 /	4 /
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RFZ151	I		2 /	
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3.0 PERSONNEL

3.1 OPERATOR MANPOWER REQUIREMENTS

Initial Operational Manpower Requirements have been determined from an analysis of crew size, crew ratio and production rate. This data is presented in Table 3-1. A three-man crew is anticipated as part of the coordinated human resource technology.

Table 3-1
OPERATIONS MANPOWER REQUIREMENTS LIST
PER FY

83	84	85	86	87	88	89	90-02	03	04	05	06	07	08	09
Crews to be Trained														
8	32	84	132	136	155	119	54	54	54	0	0	0	0	0
Total Operations and Instructor Crews Required														
8	40	120	240	352	472	544	544	540	508	432	312	192	72	0

Crew Composition

Pilot
Copilot
Navigator*
Loadmaster

BASIC REQUIREMENT

2-Crews/Aircraft
256—Unit Equipped Aircraft Peak
16—Training Aircraft Peak

TRAINING REQUIREMENT DERIVATION

FY83-89 New Crew Requirement + 10% Turnover
FY90-04 10% Turnover
FY05-09 10% Turnover Satisfied by Reassignment

*Four-man flight crew only

3.2 MAINTENANCE MANPOWER REQUIREMENTS

Initial Maintenance Manpower Requirements for avionics and landing gear have been determined through application of the Coordinated Human Resource Technology. These requirements are presented for each AFSC¹ at the squadron level and are presented in Tables 3-2 and 3-3. Data is provided for both the traditional and task oriented approach to personnel selection and qualification.

Table 3-2

MAINTENANCE MANPOWER REQUIREMENTS LIST PER SQUADRON LANDING GEAR

AFSC	Title	Conventional		Task Oriented	
		MMH/KFH	MMPWR/ SQ	MMH/KFH	MMPWR/ SQ
42350	Aircraft Electrical Systems	499.628	2.99	177.588	1.06
42330		349.642	2.09	587.596	3.52
42354	Aircraft Pseudraulics	631.082	3.78	254.465	1.52
42334		230.301	1.38	506.706	3.04
43151	Aircraft Maintenance	609.901	3.65	554.454	3.32
43131		248.397	1.49	240.388	1.44
4315W	Aircraft Maintenance (Wheels)	55.613	.33	55.613	.33
4313W		42.319	.25	42.319	.25
4315R	Aircraft Maintenance (Reclamation)	147.164	.88	137.444	.82
4315W		12.407	—	.289	—
53150	Machinist	3.410	—	3.073	—
53154	Corrosion Control	84.287	.5	84.172	.5
53134					
53155	Non-Destructive Inspection	84.321	.5	84.452	.5
53135		.149	—	.165	—

¹ Air Force Specialty Code

Table 3-3
MAINTENANCE MANPOWER REQUIREMENTS LIST PER SQUADRON
AVIONICS

AFSC	Title	2 MFD Conventional		2 MFD Task Oriented	
		MMH/KFH	MMP/ SQ	MMH/KFH	MMP/ SQ
32850	Avionics Comm	2555.61	15.3	1126.14	6.7
32830		1166.76	7.0	2236.55	13.4
32851	Avionics Nav	2254.69	13.5	1177.28	7.1
32831		1758.07	10.5	2601.92	15.6
32854	Avionics Inertial & Radar Nav	1015.64	6.1	416.68	2.5
32834		883.89	5.3	1264.43	7.6
42350	Aircraft Electrical Systems	3.37	—	3.37	—
42330		3.37	—	3.37	—
43151	Aircraft Maintenance	2839.90	17.0	2497.47	15.0
43131					
53150	Machinist	56.85	0.34	56.75	0.34
53153	Airframe Repair	64.92	0.39	63.41	0.38
53133		64.92	0.39	63.41	0.38
32651	Integrated Avionics Components (Shop)				
32631					
32652	Integral/Avionics Systems (FL)				
32631					

4.0 TRAINING

Refinement of time phased training requirements and the determination of skills, skill levels and number of personnel to be trained will be combined efforts of TAC, ATC, AFLC and AFSC² in accordance with CHRT, AFM 50-2, AFRs 50-9 and 50-29. Requests for training (crew, maintenance and depot) must be forwarded on AF Form 403 to Hq ATC as early as possible but not later than 180 days prior to training need date. A yearly screening of all commands is conducted by ATC to determine predicted training needs. ATC will normally provide training in one of the following ways:

Type I (If required) - Contractor training conducted at contractor facilities and will be implemented about 1 October 1982.

Type II - Training will be conducted at ATC Technical Training Centers and may be used to qualify additional ATC instructors, AFLC, ATC, TAC maintenance personnel.

Type III - Resident training at ATC Technical Training Centers normally consisting of general courses to align personnel with equipment used in the operational systems.

Type IV - ATC field training will be utilized for follow-on training of operational wing maintenance personnel. These courses will be developed and ready for implementation about 1 October 1983.

² Tactical Air Command, Air Training Command, Air Force Logistics Command and Air Force Systems Command

Specific training equipment for crew training has not been identified. It is, however, generally concluded that two cockpit procedures trainers (CPT) will be required for crew training. Additionally, two Instrument Flight Simulators and a Full Visual Mission Simulator complex are required. The instrument and mission simulators will be procured by the simulator SPO, ASD³ and managed by the Commodities IM⁴ Division, Ogden ALC⁵. If required, and during any factory training, maximum utilization will be made of contractor assets to include mockups, production line hardware and prototypes. Maintenance training equipment requirements and media for ATC conducted types II, III & IV. Training will be identified through standard ISD procedures after determination of the ISD/JGD mix. Depot training requirements will be definitized when depot level SE⁶ and maintenance tasks are identified.

ATC will budget for and fund necessary training programs. Training costs will be determined when trained personnel requirements are developed. Training equipment will be funded by ASD.

4.1 OPERATOR TRAINING

The aircrew personnel initially selected will transition to the AMST by participation with the contractor in an informal training program including systems familiarization and flight training. These personnel will form the nucleus of the Air Force AMST Training Program. Specific contractual tasks are to train 16 pilots and 8 loadmasters by the end of FY83.

³ Aeronautical Systems Division

⁴ Inventory Manager

⁵ Air Logistics Center

⁶ Support Equipment

The Air Force AMST Training Program is anticipated to be structured along the same lines as the C-130 Program. It will consist of two phases, Initial and Mission. The basic C-130 course outline will be modified to integrate the new and/or expanded task areas which are unique to the AMST. These are

- Crew Coordination Procedures
- Flight Control/High Lift Systems and Procedures
- Navigation Systems and Procedures
- Air Refueling System and Procedures

Additional course days beyond those required for the C-130 are anticipated. Estimates for additional time in each segment of the respective training phases is shown in Table 4-1.

Table 4-1

AMST ADDITIONAL TRAINING ESTIMATE

PHASE	SEGMENT	COURSE DAYS
Initial	Classroom/Task Training	+2
	Simulator	+2
	Flying	+2
	Written	-
Mission	Classroom and Crew Procedure	+3
	Timing	
	Flying	+4
	Written	-

Based on this information, a proposed AMST Training Schedule is provided in Table 4-2.

Table 4-2

TRAINING SCHEDULE

<u>PHASE</u>	<u>SEGMENT</u>	<u>DURATION*</u>
Initial	Class Room	14
	Simulator	16
	Flying	15
	Written	1
	Travel	<u>3</u>
		49 days
Mission	Class Room	14
	Flying	28
	Written	<u>1</u>
		43 days

*Assumes 5 day week schedule and includes weekends.

Major training aids required will be two instrument flight simulators for Initial Training and one Full Mission Simulator and two Crew Procedures Trainers for Mission Training. Schedules for procurement of these items are provided in Table 4-3 .

Table 4-3

SIMULATOR & PROCEDURES TRAINER DEVELOPMENT

Instrument Flight Simulator

Production Decision	Oct. 82
First Delivery Complete	Oct. 83
Second Delivery Complete	Oct. 84

Full Mission Simulator

Production Decision	Oct. 82
Delivery Complete	Mar. 84

Procedures Trainers

Production Decision	Oct. 82
First Delivery Complete	Mar. 83
Second Delivery Complete	Oct. 83

Coverage in the new/expanded areas will be integrated throughout training. A preliminary operator task listing is attached as Table 4-4. This table indicates general tasks which are AMST unique, flight engineer related and navigator related. These general tasks will have to be redistributed among the three crew members. An Expanded Operator Task Listing for both pilot and co-pilot is also included as Table 4-5. Those tasks underlined indicate duties beyond that performed by these same two crew members on the C-130.

Table 4-4 PRELIMINARY OPERATOR (PILOT/COPILOT) TASK LIST

FLIGHT PHASE	AMST UNIQUE	FLIGHT ENGINEER RELATED	NAVIGATOR RELATED
FLIGHT PLANNING	<ul style="list-style-type: none"> ◦ INCREASED & DIFFERENT PERFORMANCE COMPUTATIONS 	<ul style="list-style-type: none"> ◦ PREPARE PERFORMANCE DATA 	<ul style="list-style-type: none"> ◦ PREPARE FLIGHT PLAN AND NAVIGATION LOG
PREFLIGHT	<ul style="list-style-type: none"> ◦ CHECK COMPLEX FLIGHT/STABILITY CONTROL SYSTEM 	<ul style="list-style-type: none"> ◦ CHECK ALL AIRCRAFT SYSTEMS FOR OPERATION 	<ul style="list-style-type: none"> ◦ CHECK ALL NAVIGATION AND COMMUNICATION EQUIPMENT ◦ CALIBRATE/INITIATE HEADING & POSITION DEVICES ◦ CHECK ALL INTER-RELATED AVIONIC FUNCTIONS ◦ CHECK RADAR/LORAN, etc.
ENGINE START/TAXI/BEFORE TAKEOFF	<ul style="list-style-type: none"> ◦ CHECK FLIGHT/STABILITY CONTROL SYSTEM FOR OPERATION IN ALL MODES SET FOR TAKEOFF 	<ul style="list-style-type: none"> ◦ CHECK/SET ALL SYSTEMS. SET FOR TAKEOFF ◦ CHECK ENGINE PERFORMANCE 	<ul style="list-style-type: none"> ◦ CHECK NAVIGATION AND COMMUNICATIONS EQUIPMENT. SET FOR TAKEOFF ◦ UPDATE HEADING AND POSITION DEVICES ◦ SET ALL AVIONICS FOR TAKEOFF
TAKEOFF/CLIMBOUT	<ul style="list-style-type: none"> ◦ MONITOR FLIGHT/STABILITY CONTROL SYSTEM ◦ ACCOMPLISH CONFIGURATION CHANGES 	<ul style="list-style-type: none"> ◦ SET/HOLD POWER ◦ MONITOR ALL SYSTEMS AND ADJUST AS NECESSARY 	<ul style="list-style-type: none"> ◦ NAVIGATE AIRCRAFT ◦ MONITOR DEPARTURE ◦ PROVIDE TIME/POSITION DATA ◦ ACCOMPLISH ROUTE CHANGES
CRUISE	<ul style="list-style-type: none"> ◦ SET FLIGHT/STABILITY CONTROL SYSTEM FOR CRUISE 	<ul style="list-style-type: none"> ◦ COMPUTE CRUISE DATA ◦ MONITOR ALL AIRCRAFT SYSTEMS & SET/MAINTAIN FOR CRUISE ◦ SET/MAINTAIN POWER 	<ul style="list-style-type: none"> ◦ NAVIGATE AIRCRAFT ◦ PROVIDE POSITION/PERFORMANCE DATA ◦ UPDATE ESTIMATES ◦ ACCOMPLISH ROUTE CHANGES ◦ VALIDATE POSITION DATA
DESCENT	<ul style="list-style-type: none"> ◦ ESTABLISH AIRCRAFT DESCENT CONFIGURATION 	<ul style="list-style-type: none"> ◦ ESTABLISH SYSTEMS DESCENT CONFIGURATION ◦ MONITOR ALL SYSTEMS & ADJUST AS NECESSARY ◦ SET/ADJUST POWER ◦ PREPARE PERFORMANCE DATA 	<ul style="list-style-type: none"> ◦ MAINTAIN POSITION DATA ◦ VALIDATE EXTERNAL DIRECTION

Table 4-4 PRELIMINARY OPERATOR (PILOT/COPILOT) TASK LIST (cont)

APPROACH/ LANDING	<ul style="list-style-type: none"> ◦ MONITOR FLIGHT/STABILITY CONTROL SYSTEM. INITIATE CONFIGURATION CHANGES 	<ul style="list-style-type: none"> ◦ MONITOR ALL AIRCRAFT SYSTEMS ADJUST AS NECESSARY ◦ COMPUTE LANDING DATA 	<ul style="list-style-type: none"> ◦ MAINTAIN INDEPENDENT POSITION ESTIMATE ◦ VALIDATE EXTERNAL DIRECTION ◦ PREPARE GO-AROUND NAVIGATIONAL DIRECTION
ROLLOUT		<ul style="list-style-type: none"> ◦ MONITOR ADJUST ALL SYSTEMS 	
POST- FLIGHT		<ul style="list-style-type: none"> ◦ SHUTDOWN ALL SYSTEMS ◦ NOTE ALL WRITEUPS 	<ul style="list-style-type: none"> ◦ SHUTDOWN ALL AVIONICS ◦ NOTE ALL WRITEUPS
EMERGENCY PROCEDURES	<ul style="list-style-type: none"> ◦ INITIATE ALL CHECKLISTS 	<ul style="list-style-type: none"> ◦ MONITOR/SCAN ALL SYSTEMS ◦ TROUBLESHOOT MALFUNCTIONS ◦ SET SYSTEMS TO BE COMPUTABLE WITH EMERGENCY CONDITION ◦ FIGHT INTERNAL CABIN/FUSELAGE FIRE 	<ul style="list-style-type: none"> ◦ ESTABLISH POINT POSITION DATA ◦ SET ROUTE TO EMERGENCY LANDING SITE ◦ INITIATE EMERGENCY CALLS AND CODES ◦ FIGHT INTERNAL CABIN/FUSELAGE FIRE
TACTICAL LOW LEVEL		<ul style="list-style-type: none"> ◦ MONITOR ALL AIRCRAFT SYSTEMS 	<ul style="list-style-type: none"> ◦ (LEAD) NAVIGATE AIRCRAFT BY VISUAL AND/OR ELECTRONIC MEANS ◦ (IN TRAIL) VERIFY POSITION DATA - MAINTAIN FORMATION POSITION ◦ (ALL) MONITOR TERRAIN/AIRCRAFT CLEARANCE, MONITOR ROUTE & SPEEDS
AIR DROP/ EXTRACTION		<ul style="list-style-type: none"> ◦ MONITOR ALL AIRCRAFT SYSTEMS ◦ COORDINATE AIR/LOOP/EXTRACTION SYSTEM, CARGO/TROOP READINESS, AND DOOR OPENING WITH LOADMASTER 	<ul style="list-style-type: none"> ◦ (LEAD) NAVIGATE AIRCRAFT, UPDATE ETA, ENROUTE ◦ UPDATE DRIFT AND GROUND SPEED FOR DZ ◦ PROVIDE ESSENTIAL DATA TO FORMATION AIRCRAFT ◦ UPDATE CARP ◦ CALL SLOWDOWN ◦ PROVIDE DROP SIGNAL ◦ (IN TRAIL) ACCEPT/VERIFY LEAD DATA ◦ UPDATE DRIFT AND GROUND SPEED COMPUTATIONS ◦ (ALL) MONITOR TERRAIN/AIRCRAFT CLEARANCE
ASSAULT LANDING	<ul style="list-style-type: none"> ◦ MANAGE FLIGHT CONTROL AND STABILITY SYSTEMS ◦ MONITOR AIRSPEED/ALTITUDE/DESCENT RATE 	<ul style="list-style-type: none"> ◦ MONITOR ALL SYSTEMS AND INITIATE CHANGES AS NECESSARY 	<ul style="list-style-type: none"> ◦ MAINTAIN POSITION AND GO-AROUND NAVIGATION DATA

Table 4-5

EXPANDED OPERATOR TASK LIST

FLIGHT PLANNING

Pilot

Pick up mission kit at ops.
Report for mission briefing.
Conduct crew briefing.
File flight plan

Co-Pilot

Pick up nav kit at ops.
Report for mission briefing.
Receive crew briefing.
Check NOTAMS meals, payload, and fuel load. Verify route, flight plan, charts, and wx.

PREFLIGHT

Pre-flight aircraft exterior: walk around.

Interior: cabin-visual check cargo and pax load, cabin equipment. Cockpit - check pilot equipment.

Before starting: engines check-list; check all pilot switches, controls, and displays for proper indication and operation.

Intercom check

Copy flight clearance

Verify loads w/loadmaster and aircraft status w/crew chief.
Report results to pilot.

Interior: cabin-visual check cargo and pax load, conduct pax, briefing cockpit, check co-pilot, nav and comm equipment. Set up cockpit with proper charts, maps, and frequencies. Check nav station equipment.

Check all co-pilot, nav & comm switches controls and displays for co-pilot.

Intercom check

Communications check*

Copy flight clearance

*formation

Table 4-5 (Continued)

EXPANDED OPERATOR TASK LIST (Continued)

ENGINE START/TAXI/BEFORE TAKEOFF

Starting engines checklist. Starting sequence as required, pressures and temperatures in limits.

Before taxi checklist, Check all systems controls and displays as directed.

Taxi checklist. Systems, controls, and displays checked as required.

Before takeoff checklist. Configuration and systems checked and set.

Line up checklist. Switches, controls and engines set and checked for takeoff.

Starting sequence as required, pressures and temperatures in limits.

Before taxi checklist, Check all systems controls and displays as directed. Check nav receivers radar and other nav systems
Taxi clearance Flight check-in*

Taxi checklist. Systems, controls, and displays checked as required. Nav systems checked and set.

Before takeoff checklist. Configuration and systems checked and set. Tower frequency. Formation Check-in*

Line up checklist. Switches, controls and engines set and checked for takeoff. Compass and nav systems checked and set.

TAKEOFF/CLIMBOUT

Takeoff sequence aircraft control through roll and lift off.

After takeoff checklist, turn and climb. Adjust power and airspeed.

Perform IMC SKE formation join-up. SKE (and AWADS) equipment airborne checks.

Power set, systems monitored
Nav systems monitored.

Accomplishes after takeoff checklist and responds to frequency change. Adjust configuration and check systems. Departure radios and nav equipment set. Departure frequency, Check-in.*

Set up enroute nav radios and equipment. Assist pilot in formation join-up. Backs up SKE with radar. Sets up nav equipment for enroute. Make appropriate entries in nav log.

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DYNAMICS RESEARCH CORP WILMINGTON MASS
HUMAN RESOURCES, LOGISTICS, AND COST FACTORS IN WEAPON SYSTEM D--ETC(U)
SEP 79 G F KING, W B ASKRE

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Table 4-5 (Continued)

EXPANDED OPERATOR TASK LIST (Continued)

CRUISE

Level off, set cruise power, initiate cruise checklist, establish cruise course in relation to formation.

Station keep in cruise configuration. *

Brief approach to be flown and initiate descent checklist. Assumes aircraft control.

Accomplish cruise checklist, respond to frequency change to enroute frequency, establishes IFF/SIF LAW penetration procedures. Entries in fuel log, monitor formation position.

Monitor aircraft systems, make necessary position reports with controlling agency. Monitor nav systems, keep nav and fuel logs. Update INS Backup SKE Position. * Maintain comm with flight. *

Fly aircraft and station keep and confer with pilot on destination approach. Select appropriate squawk communicate with approach. Complete checklist. Tune and identify radios for initial approach courses. Set up nav equipment for descent, approach and landing.

APPROACH/LANDING

Start approach upon reaching (IAF) Initial Approach Fix. Penetration phase Low altitude level off and slowdown, initiate before landing, checklist, configures instrument mode for approach course guidance.

Final approach guidance is flown.

Transitions to visual guidance and lands aircraft.

Monitors headings, altitude and air-speed, tunes and identifies nav radios for final app. course. Completes checklist, configures aircraft for landing. Maintains communication with controlling facilities.

Monitor approach and search for runway. Monitor nav aid signals.

Calls "visual" and confirms aircraft configuration.

Table 4-5 (Continued)

EXPANDED OPERATOR TASK LIST (Continued)

ROLLOUT/POST FLIGHT

Clear active runway and taxi to parking.

Park aircraft and engine shutdown checklist.

Before leaving aircraft checklist, complete aircraft forms and post flight walkaround inspection.

Accomplish and turn in mission completion forms. Debrief.

After landing checklist. Maintain communications. Complete nav and fuel logs.

Park aircraft and engines shutdown checklist.

Before leaving aircraft checklist, complete aircraft forms and post flight walkaround inspection.

Accomplish and turn in mission completion forms. Debrief.

Table 4-5 (Continued)

EXPANDED OPERATOR TASK LIST (Continued)

AIR REFUELING

<u>Pilot</u>	<u>Co-Pilot</u>
Call for rendezvous checklist.	Contact taker, Relay SKE signals, Master fuel switch-ON. <u>Adjust radar Identify taker beacon signal, notify pilot of range and bearing of tanker.</u>
	Aux tanks - OFF. Cross feed valves - OFF. Main manifold interconnect - ON. Refuel valve switches - OPEN. Signal amplifier switch - NORMAL. Manual toggle latch switch - RELEASE. Anti-ice - OFF. Starter switches - CONTINUOUS
Reduce power - slow to 280KIAS	Relays SKE signals. <u>Call 12 o'clock/100 miles. Call 12 o'clock/90 miles.</u>
Instruct tanker to slow to 255K.	Instruct formation move to refueling formation position.
Calls for "Prepare for Contact Checklist"	Air conditioning system - checked. Radar - standby.. No smoking signs - ON
Autopilot - disengaged	Slipway door switch - OPEN
Speedbrake - positioned	Ready light - ON
Slows to 275K	Anticollision light - OFF
Contacts ESSO 69 boomer	Navigation lights - OFF
Slows to 270K at 1 mile	Servos engage switch - ENGAGE Aerial Refuel switch - ON. Signal amplifier reset button - RESET
Slows to 265K at 1/2 mile. Joins tanker in refueling position.	When contact is made: Ready light - OUT. Contact made light - ON. Main tank and Aux tank control switches - Adjust to refuel tanks in proper sequence. Refueled at 6000 lbs/min.
Flight formation with tanker.	
Talks to Boomer and tanker pilot.	Advises pilot that refueling is completed. (If tanks are full, valves shut off and disconnect occurs automatically.

Table 4-5 (Continued)

EXPANDED OPERATOR TASK LIST (Continued)

Air Refueling (continued)

When boom is disconnected, reduces power, pushes aircraft over, clears tanker and moves to position 60 degrees to left of tanker at 2 miles and 1000' above. Calls clear to ESSO 69.

Speedbrakes - IN. Calls for "Post Air Refueling Checklist"

Reaches FL 270 and levels off

Other aircraft assume visual formation separation and SKE discontinued.

Initiate climb and cruise

Advises other formation aircraft to move in for refueling.

Anticollision lights - ON
Navigation lights - ON.
Slipway doors - CLOSED - light checked. Slipway light switches - CLOSED indicator checked.
Scavenge system switch - ON

Calls 12 o'clock/80 miles

Reports altitude to tanker. Notifies formation to discontinue SKE. *

Maintains visual and radio contact with formation. *

Calls out bearing and range to tanker each 10 miles from 100 to 50 miles.

Call out bearing and range to tanker each 5 miles from 50 to 25 miles.

Call out bearing and range to tanker each mile from 25 miles to approximately 15.

Instruct tanker to start his 180 degree left turn to place the aircraft on a parallel track at approximately 3 miles.
Establish visual contact and advise pilot.
Call 3 miles.

Master refuel switch - OFF

Fuel system panel switches positioned
Complete fuel log.

Radar - ON

Scavenge system switch - OFF

Check INS Position

Starter switches - OFF

Complete roll call. *

Advise formation of intentions. *

Table 4-5 (Continued)

EXPANDED OPERATOR TASK LIST (Continued)

TACTICAL FORMATION TAKEOFF/CLIMB

<u>Pilot</u>	<u>Co-Pilot</u>
Taxi to departure end of runway	Check systems operation, complete checklist, complete IFF/SIF check.
Taxi checklist (including cockpit instrument check). Before takeoff checklist takeoff briefing.	Complete checklist, set radar, comm & nav radios and SKE controls for departure
Monitor UHF (Interformation)	Monitor UHF (Intraformation)
Coordinate take-off time with FCI signal	Monitor VHF (Control)
Taxi on to runway	Coordinate take-off time with FCI signal
Line-up check list	
Center aircraft on runway	Complete line-up checklist
Set throttles - full	Advance throttles
Scan Instruments	Scan Instruments
Release brakes and begin takeoff using nose wheel steering	Reset throttles for exact takeoff power settings
	Notify tower on VHF
	<u>Prepare for acceleration check</u>
	Scan flight instruments to ensure that critical failures will be observed immediately during takeoff
Discontinue nose wheel steering (60 to 70 knots) and maintain directional control with rudders and aileron	
Initiates rotation 5 knots before V ₂ . Calls for "gear up" (visual and aural) after established in climb.	Checks Go-No-Go parameters
	Calls passing V ₁
	Raises gear upon pilot's command and continues to monitor instruments.

Table 4-5 (Continued)
EXPANDED OPERATOR TASK LIST (Continued)

Tactical Formation Takeoff/Climb (continued)

After gear indicates safely up
(8 to 10 seconds after initiation),
call for "flaps up"

Establish normal climb when
airspeed reaches 250 KIAS

Reduce power to normal rated
thrust

Call for after takeoff and climb
checklist

Call departure control

Squawk as required

Contact interformation for
status. Relay a/s and
altitude information

Contact ACP on HF as required

Direct co-pilot to set turn
signal on FCI as required

Level off - set cruise power
Call for cruise checklist

Maintain assembly speed until
all aircraft in position

Initiate and/or obscure
acceleration signal through the FCI

Set power for 310 KIAS

Reset FLAP level and check
hydraulic quantity and pressure
while flaps are in transition

Set up radar and station keeping
equipment to TWS

Pick up other aircraft as they
become airborne. Report
relative position in formation

Accomplish checklist

Signal turns

Relay status on intraformation
frequency.

Switches to radar weather (WX) scan
momentarily to search for icing
conditions or buildups.

Set up equipment for enroute navigation
Make entries in logs

Set up and identify enroute nav radios
and equipment

Contact military radar as required

Relay intraformation instructions to
cruise. Accomplish cruise checklist.

Change to enroute frequency
Monitor aircraft position, update
position in AWADS computer and
make entries in nav and fuel logs

Set assembly power

Set cruise power

Table 4-5 (Continued)
EXPANDED OPERATOR TASK LIST (Continued)

LOW ALTITUDE PROXIMITY EXTRACTION SYSTEM (LAPES)

<u>Pilot</u>	<u>Co-Pilot</u>
Call for standard 10 & 20 min. warning checklists	Checklists complete. <u>Advise pilot of position at pre-IP</u> <u>Update INS</u>
Reduce power Descent to 1500' MSL	Contact local control Check DZ and conditions Call six minute warning Complete six minute warning Checklist
Calls "Slow Down" and reduces power. Calls for Before Landing Checklist.	Call IP Accomplishes checklist including: Gear-down Flaps - 50%
Descents to 500'. Visually observes the drop zone as they approach. Determines best drop course. 30 seconds after passing DZ, begin an approx. 270 degree turn to final drop course. Descents to 5' above DZ.	Confirm terrain height to pilot & elevation of DZ Calls 1 minute warning. LM acknowledges
10 seconds before drop call "red light."	Turns red light on. Turns ADS switch on. Acknowledge LM call that parachute is stabilized. Calls "green light". Stands by forward circuit breaker for emergency release of parachute extraction if necessary.
Adds power. Starts climb. Call "Gear Up" Call "Flaps Up" Call "Go-around checklist"	Acknowledge LM that load is clear. Red light - ON Raise gear Raise flaps Accomplish go-around checklist Red light - OFF Acknowledge LM "Ramp and Door - Closed and Locked."

Table 4-5 (Continued)

EXPANDED OPERATOR TASK LIST (Continued)

TACTICAL AIR DROP

Pilot

Review drop procedures & data
Direct copilot to relay descent
signal on FCI

30 seconds later, reduce power
and begin descent to drop
altitude (10,000 MSL)

Instruct co-pilot to relay
required maneuver data on FCI.

Direct co-pilot to transmit level
off signal on FCI.

Level off at 10,000 MSL and
adjust power to maintain
300 KIAS

Direct co-pilot to relay slow
down and signal on FCI

Co-Pilot

Set INS, radar & GPWS as required
Initiate 20 min warning checklist and
receive acknowledgment from LM

Review drop procedures & data

Relay descent instructions on FCI.
(30 second warning, 5 second
warning and execute).

Initiate required radio calls

Acknowledge call from LM that
20 min check is completed.
Confirm maneuver points on radar.
Relay instructions as required on
FCI (30 second warning, 5 second
warning and execute)
Initiate 10 minute warning check-
list and receive acknowledgement
from LM.

Relay instructions on FCI (30
second warning, 5 second warning
and execute).

Depressurize cabin, reset
altimeters, complete checklist,
anti-icing/de-icing - OFF
Acknowledge call from LM that
10 min check is completed

Confirm position on radar. Update
position in AWADS. Update INS.
Establish contact with Drop Zone (DZ)
Calls Pre-IP
Continues to monitor aircraft track
and altitude

Relay instructions of FCI (30 second
warning, 5 second warning and
execute). Calls "slow down checklist"
on IC.

Table 4-5 (Continued)
EXPANDED OPERATOR TASK LIST (Continued)

Tactical Air Drop (continued)

Reduce power to slow aircraft
toward drop speed (120 kts)

Open speed brakes

Stabilize at 120 KIAS

Speed brakes - UP

Wings flaps - 30% cargo
50% personnel

Flies steady course

Call six minute warning, LM
acknowledges

Turn red light - ON

Pressurization - no pressure
Altimeters - SET

SKE secondary control panel -
SET

Approve LM's call requesting
permission to open the rear cargo
doors. Acknowledge loadmaster
report that cargo door was
opened and locked. Cargo open
Air Deflector Doors - personnel.
Acknowledge completion of six
minute and slow down checklist
from LM.

Acknowledge previous element
clear of DZ on schedule.

Acknowledge call from DZ, "troops
are clear". Completes checklist.

Call "1 minute warning". Receive
LM acknowledgment of 1 minute
check completed. At release point,
call and activate "green light". - cargo.

Actuates ADS - cargo

Call "5 seconds," "green light" and
actuate green light - personnel.

Relays "execute" signal on SKE.

Acknowledge LM call that "load is
clear".

Time duration of drop, and actuate
"red light".

Acknowledge LM call that cargo door
is closed and locked. - cargo.

Acknowledge LM that paratroop doors
are closed and secured - personnel.

Table 4-5 (Continued)

EXPANDED OPERATOR TASK LIST (Continued)

Tactical Air Drop (continued)

Calls "Flaps up"
Starts immediate left turns.
Adds power to accelerate.

Turn red light "off." Request pilot to accelerate.
Retract flaps. Closes air deflector doors and checks warning lights off. Reset pressurization. Confirm drop checklist completed.
Call out recovery procedure.
Check position.

4.2 MAINTENANCE TRAINING

The ISD/JGD tradeoff analysis will dictate scope and composition of maintenance training, however, the following courses are anticipated

<u>AFSC</u>	<u>Title</u>
328X0	Avionics Communications
328X1	Avionics Navigation
328X4	Avionics Inertial & Radar Navigation
423X0	Aircraft Pseudraulics
431X1	Aircraft Maintenance
531X3	Airframe Repair

At the present time Types I, II, III and IV training is anticipated. The training program will be carried out in phases.

Phase I

Prior to initiation of the Production Phase, a cadre of C-130/C-141 maintenance personnel will be selected for special training on the avionics and landing gear systems of the AMST. The training will be Type I. This requirement and start dates will be established as a result of coordinated & timely planning between Hq ATC and contractor personnel. ATC will define maintenance training course requirements, issue a Request for Proposal (RFP), negotiate a contract for training and issue training quotas.

These individuals will establish and man the Type II & IV training required to qualify the initial AMST maintenance crews. The training course, content and equipment, materials, etc. can be modified during this phase on the basis of experience gained in training the cadre.

Phase II

Based on projected manpower requirements, a sufficient number of maintenance personnel will be trained for the AMST. For the most part, these will be experienced personnel from C-130/C-141 systems. They will have had Basic Military Training, Conventional Technical Training and, perhaps, some Special Training. Their training for AMST will be highly specialized toward the operation and/or maintenance of new items of equipment and in new operational techniques and procedures unique to AMST. Thus, during the early stages of production through to the operations phase the system will be supported by trained, qualified personnel.

Phase III

Phase III involves the gradual infusion into the system of less experienced maintenance personnel. It is not practical or cost effective to utilize only experienced personnel in the system. For that matter, one of the explicit objectives of an integrated ISD/JGD program is to enable less experienced personnel to maintain the system at the same or higher level of effectiveness as more experienced personnel and at a lower cost.

The actual nature of the training programs will be totally influenced by the selection of either the traditional or task oriented approach to the qualification of personnel. Should the traditional approach be selected little change will be required in the technical training courses. Should a task oriented approach be selected, significant reduction can be realized

in the technical training area. Estimated course lengths are shown in Table 4-6.

Table 4-6
COURSE LENGTH

AFSC	Title	Conventional	Task Oriented
32850	Avionics Comm		
32830		28 wks	13 wks
32851	Avionics Nav		
32831		30 wks	13 wks
32854	Avionics Inertial &		
32834	Radar Nav	27 wks	15 wks
42350	Aircraft Electrical		
42330	Systems	19 wks	11 wks
42354	Aircraft Pneudraulics		
42334		11 wks	8 wks
43151	Aircraft Maintenance		
43131		11 wks	8 wks
53150	Machinist		
53153	Airframe Repair		
53133		13 wks	8 wks
53154	Corrosion Control		
53134			
53155	Non-Destructive	3 wks	2 wks
53135	Inspection	14 wks	10 wks

The task oriented training can also be supplemented by dual channel OJT which consists of:

1. Career Development Courses - self study course designed to present the knowledge necessary for versatility and career advancement.
2. Job Proficiency Courses - courses designed toward enhancing specific job proficiencies.

Additionally, the system requirement for job guide documentation per MIL-M-83495 is totally compatible with task oriented training.

In summary, this training plan is applicable to either a traditional or task oriented approach to personnel qualification. It will also enable an orderly transition from traditional to task-oriented training while allowing the gradual utilization of lower skill level personnel without sacrificing the integrity and effectiveness of the system.

5.0 JOB GUIDE DOCUMENTATION (TECHNICAL ORDERS)

The management of the acquisition job guide documentation for the AMST System will be assigned to the Deputy Program Manager for Logistics (DPML), consequently, the Technical Order Management Agency (TOMA) is ASD on an as-required basis.

The manuals required for operational support will be listed in a composite technical manual plan. Individual manuals will be identified to the appropriate specification. The identification of manuals for Contractor Furnished (CFE) Ground Support Equipment will be accomplished on a continuing basis and will provide for concurrent development and delivery of support equipment technical manuals with the support equipment. Contractor requests for deviations/waivers and/or interpretations to the preparation specifications are approved/disapproved by the Technical Publication Review Board composed of ASD, AFLC, MAC, ATC personnel and AFSC users of the equipment and aircraft.

Equipment manuals for training equipment, simulators, support equipment and contractor furnished airborne equipment will be separately recommended by contractor submission of CFAE/CFE notices in accordance with ASDAD 71-4 and MIL-N-7384. The recommendations specify the applicable preparation specifications and supplies for intermediate level maintenance.

Formal publications are planned for initial delivery with only selected verification as approved by ASD with assistance from AFLC. A selection conference will be required at an appropriate time in the program for judicious selection and verification planning. The selection conference consists of representatives from ASD, AFLC, ATC, MAC and the contractor.

The Prime ALC will approve and ASD will coordinate on CPAE/CFE notices which will cause the preparation of equipment technical manual preparation.

In-process reviews of manuals will be conducted at the Government's option. ASD will provide chairmanship of in-process reviews. Representation from the equipment prime ALC Technical Services Branch and TO Systems Branch, MAC, and ATC will participate.

Production manual preparation entails steps necessary to convert the edited manuscript to the deliverable product. Grammatical editing, typing, proof reading, page layout and make-up, and reproduction of the reproducible pages are planned as conventional processes during the preliminary manual program.

The contractor will conduct an active validation program which will validate the manuals during preparation and on a continuing basis for revision/changes after initial publication. CPAE/CFE manuals will also be validated.

Verification of technical orders will be conducted in accordance with T.O. 00-5-1 and AFR 8-2. Tasks will be accomplished by representatives from AFLC, ATC, MAC and AFFTC, under the direction of ASD. Preliminary technical orders procedures will be utilized on the appropriate hardware to determine suitability. Verification will be conducted in accordance with an ASD/AFLC approved verification plan.

Prepublication reviews will be accomplished prior to delivery of technical manuals and are held to determine that the manual meets Air Force requirements and applicable specifications. This requirement may be satisfied by an in-process review if the technical manual meets Air Force requirements. Chairmanship for prepublication reviews will be provided by ASD. Assistance will be provided by AFLC and major air commands.

The contractor will deliver photolithographic negatives to the AFPRO for formal publications. AFPRO will send negatives to a government printing office. AFLC will initiate distribution of technical manuals.

6.0 REFERENCES

- 1. Air Force Manual 50-2. Instructional System Development. Washington, D. C. : Department of the Air Force. Under revision.**
- 2. Air Force Regulation 8-2. Air Force Technical Order (T.O.) System. Washington, D. C. : Department of the Air Force. Under revision.**
- 3. Air Force Regulation 50-9. Special Training. Washington, D. C. : Department of the Air Force, 6 March 1974.**
- 4. Air Force Regulation 50-29. Education and Training of Foreign Military Personnel. Washington, D. C. : Department of the Air Force, 3 May 1976.**

A-XI.

**AMST UNIQUE
SOC DATA**

Note: Specific equipment data and lists are not included. Although it is available in the CHRT historical records, the form and format of the data have changed. A complete set of equipment data and costs will be included in the final demonstration report covering the results in a minimum engineering development (full-scale development) phase.

AMST UNIQUE

SOC DATA

FLYING TIME PER AIRCRAFT

1.8 HOURS/DAY ON 5 DAY/WEEK - PEACETIME

4.0 HOURS/DAY ON 7 DAY/WEEK - WARTIME

MAINTENANCE CREW DATA

5 DAY/WEEK ON 8 HOUR SHIFT, .6 EFFICIENCY - PEACETIME

6 DAY/WEEK ON 12 HOUR SHIFT, .8 EFFICIENCY - WARTIME

OPERATIONS CREW DATA

POSITION -	Pilot	Copilot	Navigator	Loadmaster	Crewchief
Rank -	0-3	0-2	0-2	E-5	E-5
YOS -	12	4	4	6	6

**AMST UNIQUE
SOC DATA (continued)
DETAILED - PHASED SCHEDULE**

Fiscal Year	Production				Aircraft				Flytime/Year				Crew †			
	UE		NOA		Avg. No. Available		Total End Year		UE		NOA(*)		Training		Total End Year	
	UE	NOA	UE	NOA	UE	NOA(*)	UE	NOA(*)	UE	NOA	UE	NOA**	OPS	Inst.	OPS	Inst.
FY83	0	4	0	2(2)	0	4(4)	0	4(4)				936	0	8	0	8
FY84	12	4	6	6(6)	12	8(8)	2808	2808				2808	24	8	24	16
FY85	36	4	30	10(10)	48	12(12)	14040	4680				4680	76	8	96	24
FY86	56	4	76	14(14)	104	16(16)	35568	6552				6552	124	8	208	32
FY87	56	4	132	18(16)	160	20(16)	61776	7488				7488	136	0	320	32
FY88	60	0	190	20(16)	220	20(16)	88920	7488				7488	155	0	440	32
FY89	36	1	238	20(16)	256	21(16)	111384	7488				7488	119	0	512	32
FY90-02	0	0	256	21(16)	256	21(16)	119808	7488				7488	54	0	512	32
FY03		-4	256	19(15)	256	17(14)	119808	7020				7020	54	0	512	28
FY04	-16	-0	248	17(14)	240	17(14)	116064	6552				6552	54	0	480	28
FY05	-32	-8	232	13(11)	208	9(8)	108576	4680				4680	0	0	416	16
FY06	-56	-4	180	7(6)	152	5(4)	84240	2808				2808	0	0	304	8
FY07	-56	-4	124	3(0)	96	1(0)	59032	0				0	0	0	192	0
FY08	-60	-0	66	1(0)	36	1(0)	30888	0				0	0	0	72	0
FY09	-36	-1	18	0(0)	0	0(0)	16848	0				0	0	0	0	0

LEGEND

UE - unit equipped
NOA - not operationally available
OPS - operational crews
INST - instructor crews

NOTES

* - NOA A/C used for training
** - time reflects 1.8 hr./day for training aircraft
† - crew requirements based on 2 crews/aircraft

AMST UNIQUE
SOC DATA (continued)
KEY EVENT AND OPERATIONAL READINESS SCHEDULE

Date	Event	Tng Sg	Ops Sg	Conus Locations		O/S Locations	
				No.	Sg/Loc	No.	Sg/Loc
Oct 82	Production Decision						
Oct 82	Inst. Delivery	1	-	1	1	-	-
Oct 83	4 A/C	1	-	-	-	-	-
May 84	IOC	1	1	1	2	-	-
Oct 84	20 A/C	1	1	1	2	-	-
Oct 85	60 A/C	1	3	2	2	-	-
Oct 86	120 A/C	1	7	3	2	1	2
Oct 87	180 A/C	1	10	3	3	1	2
Oct 88	240 A/C	1	14	3	3	2	2
Oct 89	277 A/C	1	16	4	3	2	2
Oct 03							
Oct 04							
Oct 05	273 A/C	1	16	4	3	2	2
	287 A/C	1	15	3	3	2	2
				1	2		
Oct 06	217 A/C	1	13	3	3	2	2
Oct 07	157 A/C	-	10	3	2	2	2
Oct 08	97	-	6	2	2	1	2
Oct 09	37	-	2	1	2	-	-
Oct 10	0	-	-	-	-	-	-